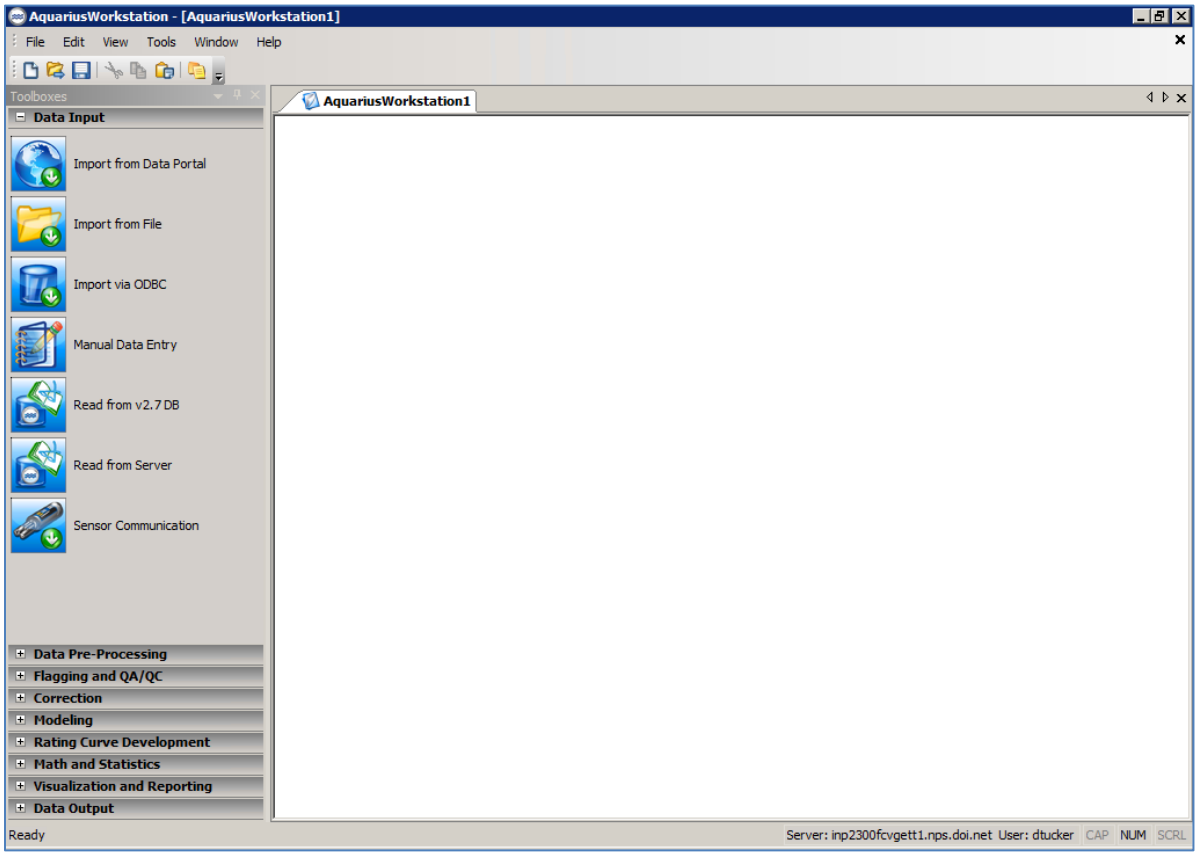
Aquarius v.3.0 Release 5 Whiteboard Introduction

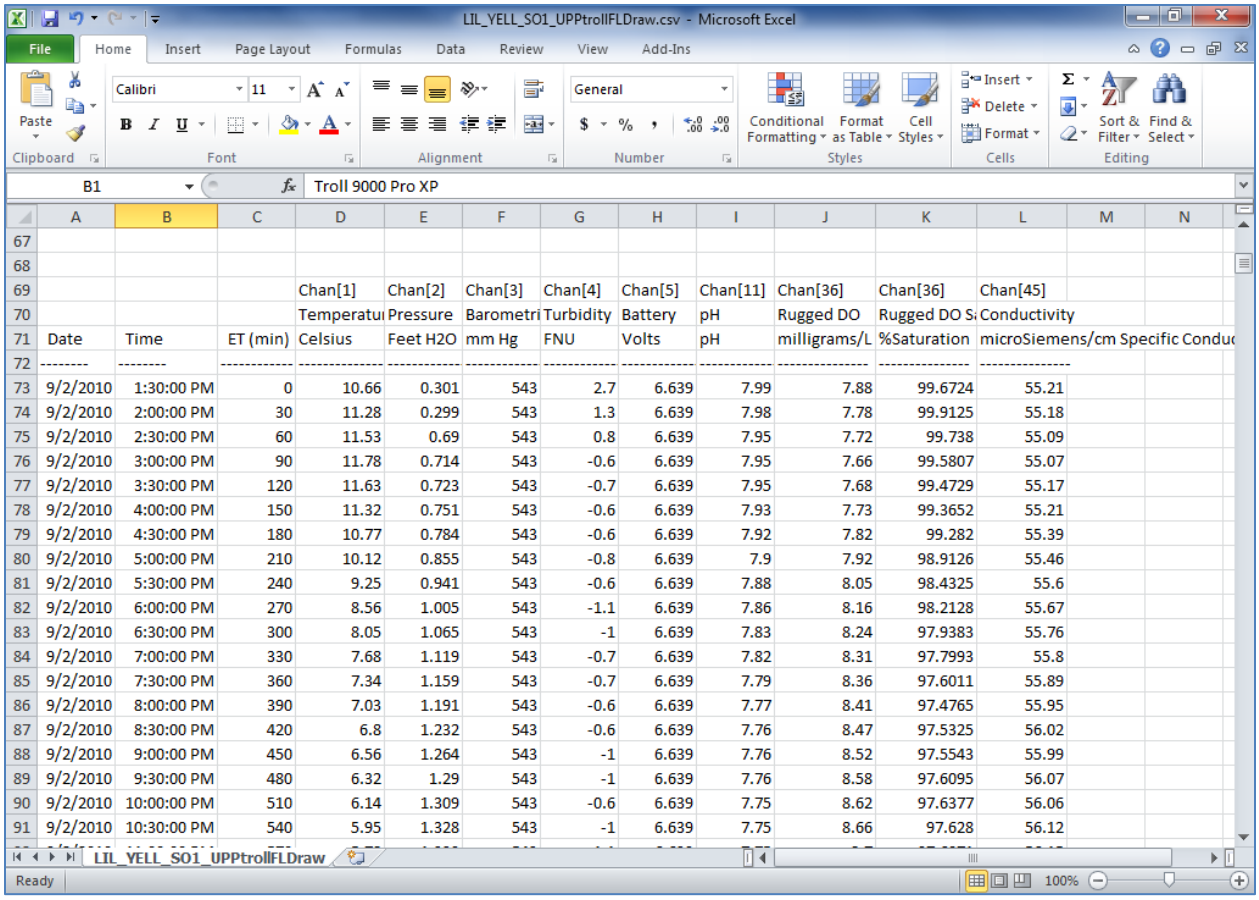
To view a video demonstration of what is written here, click the hyperlink in the box below.

http://nrdata.nps.gov/Programs/Water/Aquarius/Videos/Introduction_Aquarius_3_Whiteboard_R5/Introduction_Aquarius_3_Whiteboard_R5.html

This document introduces the basic use of the Aquarius Whiteboard by importing some real time series data, examining and manipulating it, and then saving it to the database. If you haven't done so already, follow the instructions here to access the Aquarius Whiteboard on the NRSS server (inp2300fcvgett1 or GETT1). Choose 'New Whiteboard' and be sure to also connect to the Aquarius Server when prompted (i.e. **don't** click 'Go Offline') so you can access the Aquarius database. This Whiteboard Introduction begins with this screen:

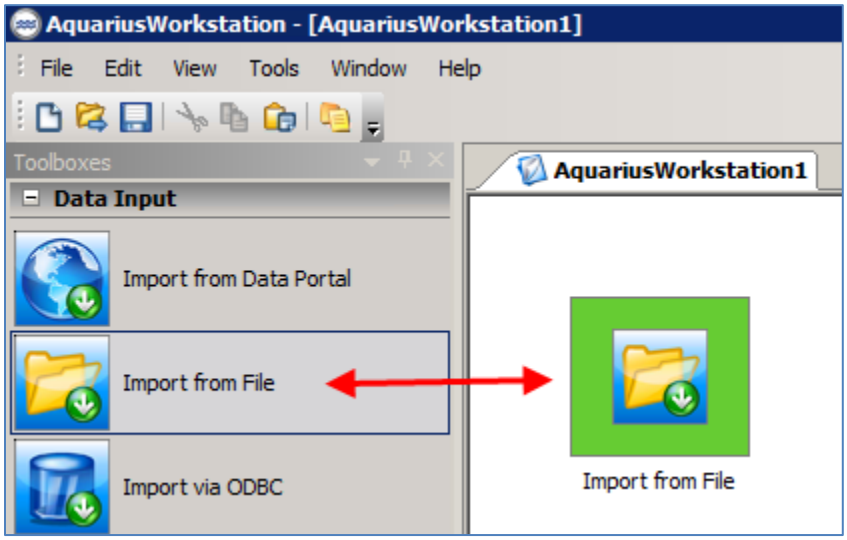


Let's import a time series data file produced by an In-Situ Troll 9000 Pro XP sonde for a location on the Colorado River in Rocky Mountain National Park near Little Yellowstone. The file appears below as saved from Microsoft Excel as a comma-separated 'CSV' file. The file basically consists of 12 columns (A-L) of data. The first two columns include the date and time; the last ten columns contain the measurements. Note: the columns can be in any order and can include data that you won't be importing. The only requirements are that there are date and time columns (or a single date/time column), at least one measured results column, and no empty rows in the data record between the first record and the last record.

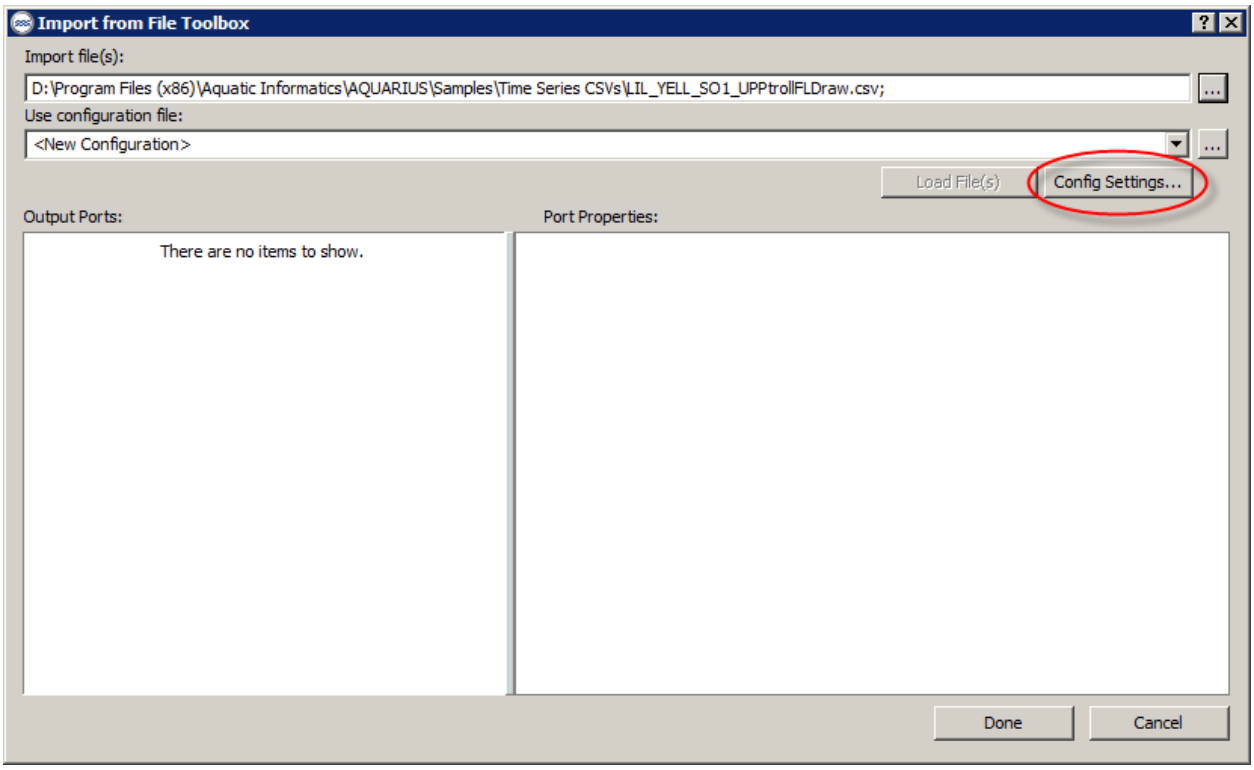


	A	B	C	D	E	F	G	H	I	J	K	L	M	N
67														
68														
69				Chan[1]	Chan[2]	Chan[3]	Chan[4]	Chan[5]	Chan[11]	Chan[36]	Chan[36]	Chan[45]		
70				Temperatu	Pressure	Barometri	Turbidity	Battery	pH	Rugged DO	Rugged DO S	Conductivity		
71	Date	Time	ET (min)	Celsius	Feet H2O	mm Hg	FNU	Volts	pH	milligrams/L	%Saturation	microSiemens/cm Specific Conduc		
72	--------	--------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------		
73	9/2/2010	1:30:00 PM	0	10.66	0.301	543	2.7	6.639	7.99	7.88	99.6724	55.21		
74	9/2/2010	2:00:00 PM	30	11.28	0.299	543	1.3	6.639	7.98	7.78	99.9125	55.18		
75	9/2/2010	2:30:00 PM	60	11.53	0.69	543	0.8	6.639	7.95	7.72	99.738	55.09		
76	9/2/2010	3:00:00 PM	90	11.78	0.714	543	-0.6	6.639	7.95	7.66	99.5807	55.07		
77	9/2/2010	3:30:00 PM	120	11.63	0.723	543	-0.7	6.639	7.95	7.68	99.4729	55.17		
78	9/2/2010	4:00:00 PM	150	11.32	0.751	543	-0.6	6.639	7.93	7.73	99.3652	55.21		
79	9/2/2010	4:30:00 PM	180	10.77	0.784	543	-0.6	6.639	7.92	7.82	99.282	55.39		
80	9/2/2010	5:00:00 PM	210	10.12	0.855	543	-0.8	6.639	7.9	7.92	98.9126	55.46		
81	9/2/2010	5:30:00 PM	240	9.25	0.941	543	-0.6	6.639	7.88	8.05	98.4325	55.6		
82	9/2/2010	6:00:00 PM	270	8.56	1.005	543	-1.1	6.639	7.86	8.16	98.2128	55.67		
83	9/2/2010	6:30:00 PM	300	8.05	1.065	543	-1	6.639	7.83	8.24	97.9383	55.76		
84	9/2/2010	7:00:00 PM	330	7.68	1.119	543	-0.7	6.639	7.82	8.31	97.7993	55.8		
85	9/2/2010	7:30:00 PM	360	7.34	1.159	543	-0.7	6.639	7.79	8.36	97.6011	55.89		
86	9/2/2010	8:00:00 PM	390	7.03	1.191	543	-0.6	6.639	7.77	8.41	97.4765	55.95		
87	9/2/2010	8:30:00 PM	420	6.8	1.232	543	-0.6	6.639	7.76	8.47	97.5325	56.02		
88	9/2/2010	9:00:00 PM	450	6.56	1.264	543	-1	6.639	7.76	8.52	97.5543	55.99		
89	9/2/2010	9:30:00 PM	480	6.32	1.29	543	-1	6.639	7.76	8.58	97.6095	56.07		
90	9/2/2010	10:00:00 PM	510	6.14	1.309	543	-0.6	6.639	7.75	8.62	97.6377	56.06		
91	9/2/2010	10:30:00 PM	540	5.95	1.328	543	-1	6.639	7.75	8.66	97.628	56.12		

Double click the ‘Import from File’ tool in the ‘Data Input’ toolbox to add it to the Whiteboard.



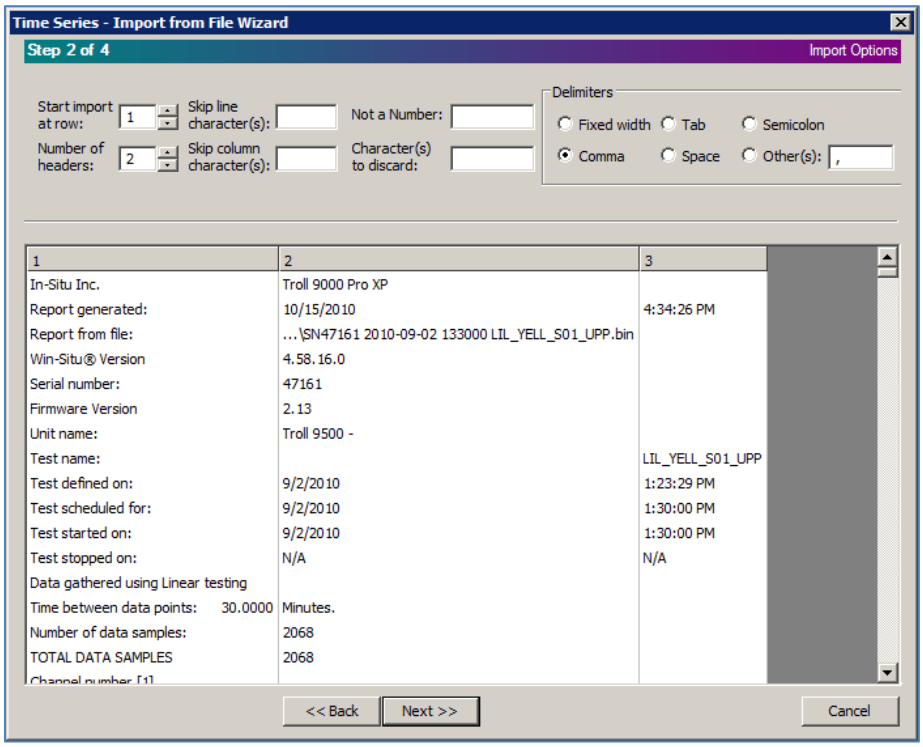
Double click the ‘Import from File’ tool on the Whiteboard to open it for use. Click the … to the right of the ‘Import file(s):’ box to browse to the location of the Little Yellowstone Colorado River file and select it.



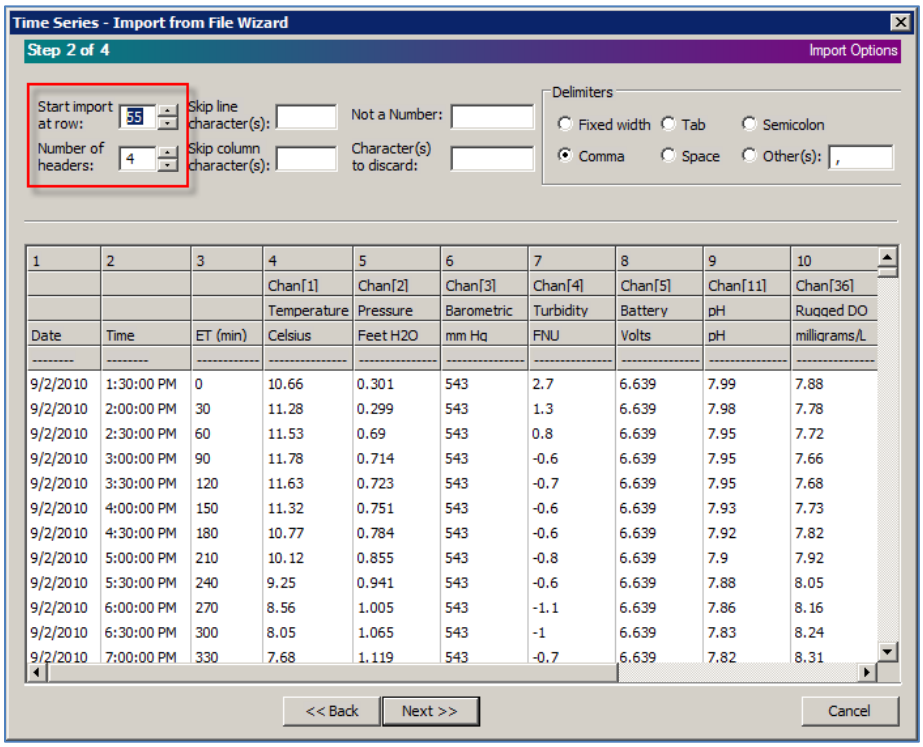
The next step is to define the configuration of the import file so Aquarius understands the file's structure and which data you want to import. Click the 'Config Settings…' option button. Aquarius will initiate a four step Import from File Wizard.

Step 1: Select the 'Time Series' radio button and 'Text File (CSV, etc) and then click 'Next >>'.

Step 2: Locate the data within the file and specify the column delimiter. Aquarius shows what the file looks like with the default specifications (Start import at row 1 and comma delimited).

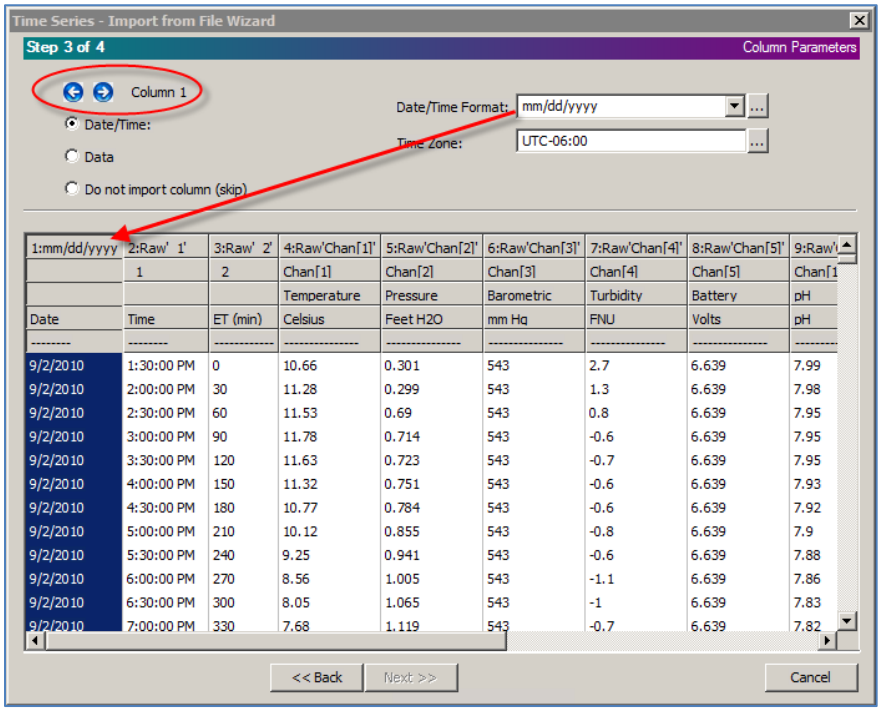


Change the 'Start import at row:' to 55 and the number of headers to 4 and then click 'Next >>'.

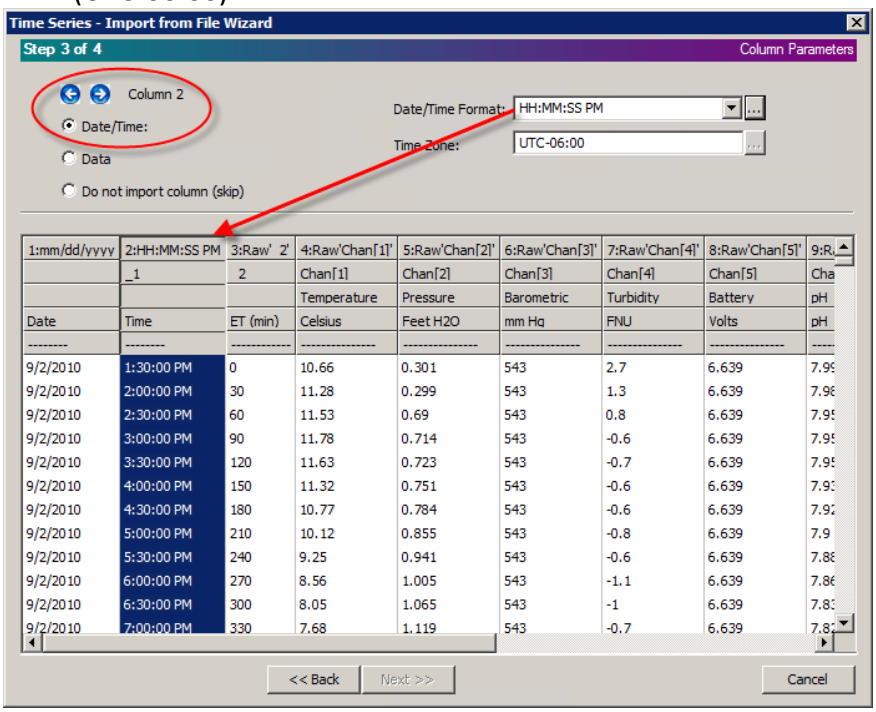


Step 3: Define what each column contains and whether to skip (not import) a column.

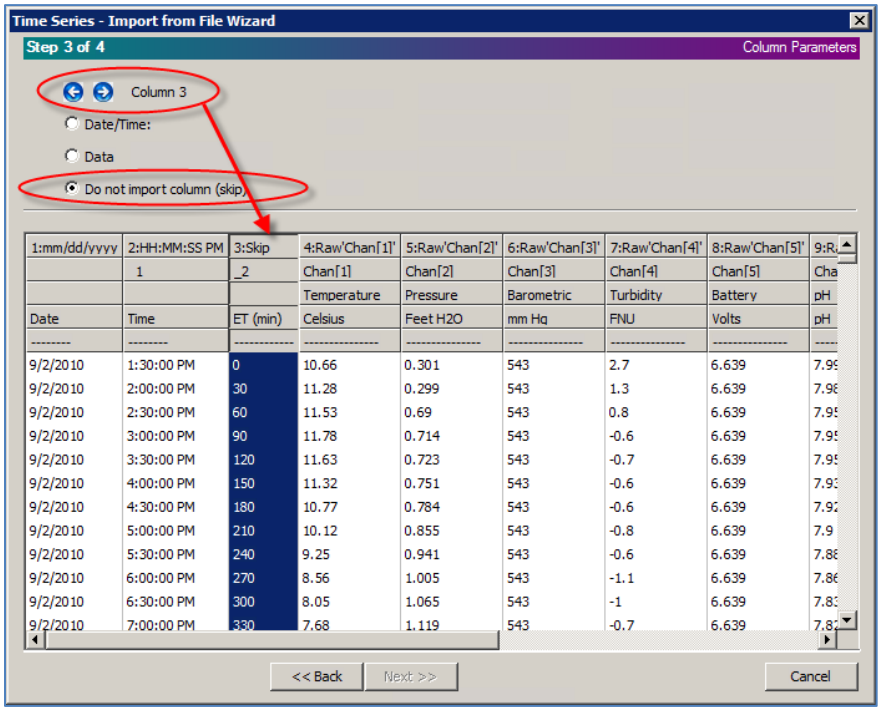
For column 1, indicate that it is a Date/Time, the format is 'mm/dd/yyyy', and the time zone is MDT (UTC-06:00).



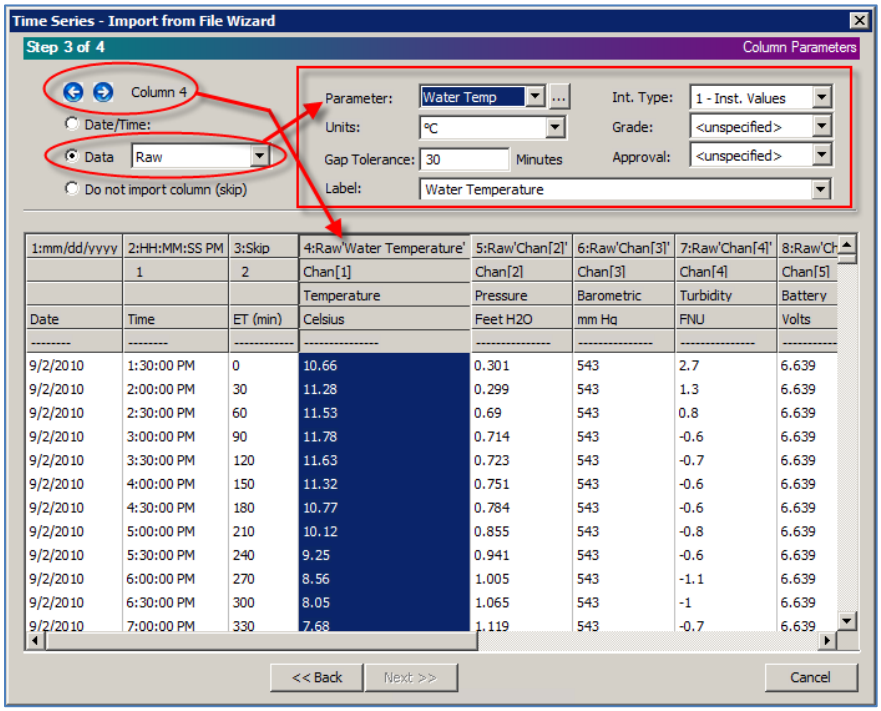
Use the blue arrows to change columns or simply click on the next column. For column 2, indicate that it is a Date/Time and the format is 'HH:MM:SS PM'. Leave the time zone set to MDT (UTC-06:00).



For column 3, click the radio button next to 'Do not import column (skip). This column contains elapsed time which we don't need.



For column 4, click the radio button for 'Data' and set it to 'Raw'. Select 'Water Temp' as the parameter, Units of degrees C, Gap Tolerance of 30 minutes, Int. Type of '1 – Inst. Values', and a label of 'Water Temperature'. You can also set Grades or Approvals here or do them later. It is probably best to leave them unspecified here.



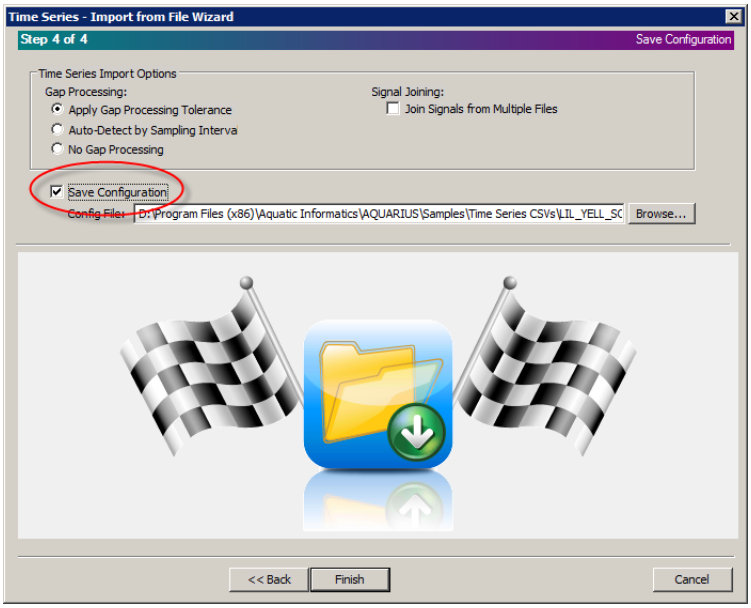
Continue to define columns 5 through 12 as done for water temperature. The appropriate entries are given below. Once all the columns are defined as per below, click 'Next >>'.

Column	Parameter	Units	Gap Tolerance	Label	Int. Type
5	Stage	ft	30	Water Depth Above Sonde	1 - Inst. Values
6	Atmos Pres	mmHg	30	Barometric Pressure	1 - Inst. Values
7	Turbidity	FNU	30	Turbidity	1 - Inst. Values
8	Voltage	V	30	Battery Voltage	1 - Inst. Values
9	pH	pH	30	pH	1 - Inst. Values
10	O2 (Dis)	mg/l	30	Rugged Dissolved Oxygen	1 - Inst. Values
11	Dis Oxygen Sat	%	30	Rugged Dissolved Oxygen Saturation	1 - Inst. Values
12	Sp Cond	us/cm	30	Specific Conductance	1 - Inst. Values

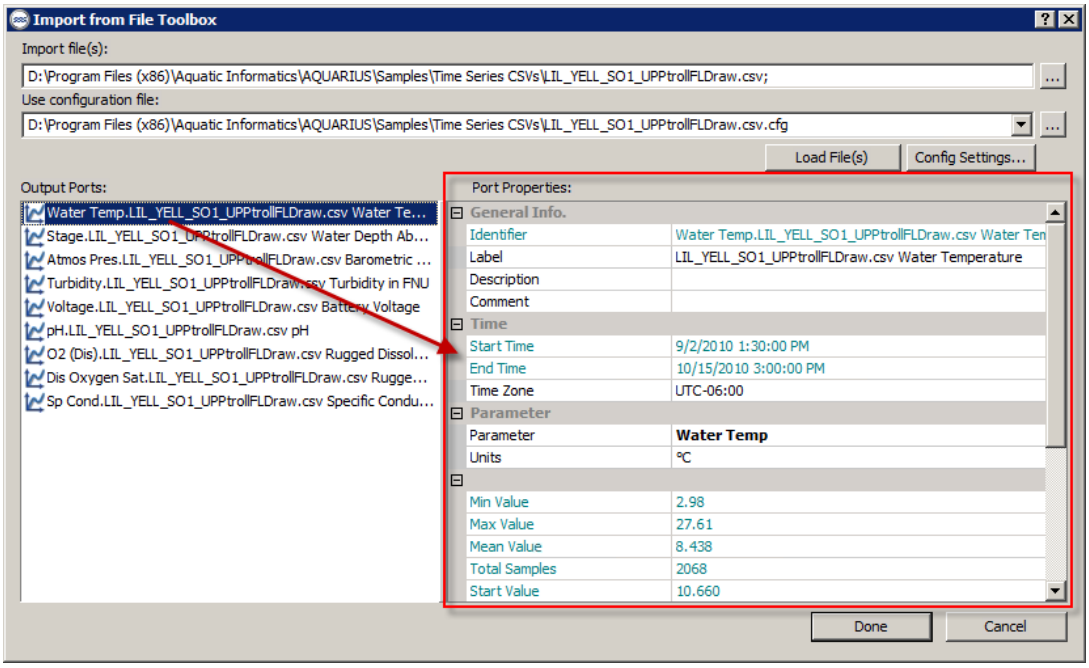
Aquarius automatically fills in a default unit of measure for each parameter. Be sure it is the unit of measure that you actually used. For example, the default for Stage is Meters, Turbidity is NTU, and Barometric Pressure is kPA. You'll want to change those units to match the units above.

Note: Gap Tolerance defines how much time can elapse between consecutive measurements after which Aquarius would identify a 'gap' in the time series. For important information on the complexities of Gap Tolerance, check out the Aquarius Frequently Asked Questions. 'Int. Type' defines the interpolation type and is used for graphical and reporting purposes. Here '1 – Inst. Values' identifies these time series measurements as instantaneous values.

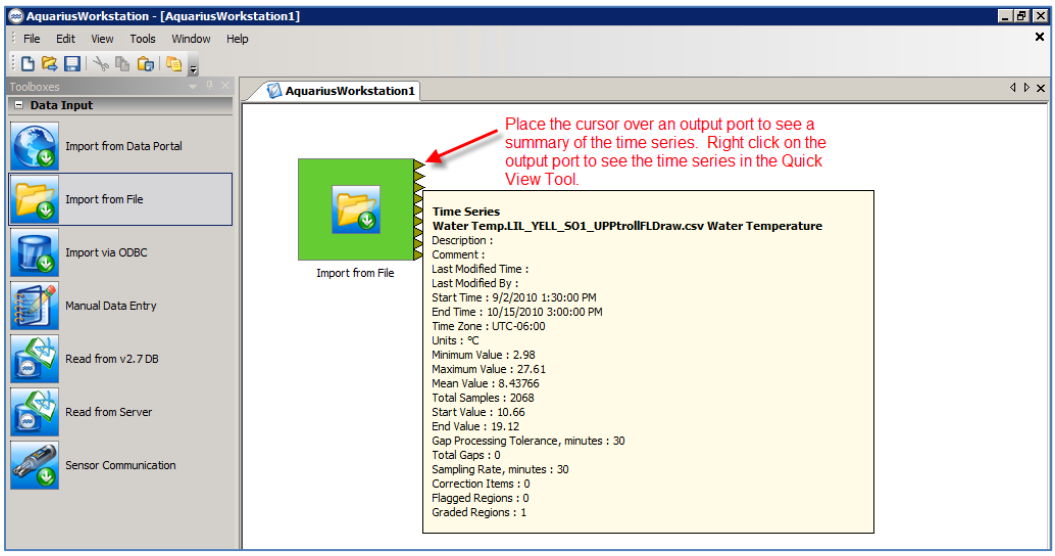
Step 4: Go with the default Gap Processing option which means Aquarius will identify any gaps longer than 30 minutes in the import file. Check the box next to 'Save Configuration' to save the import file definition/specification you created so you can re-use it with the same or similarly structured/formatted files in the future. When done, click 'Finish'.



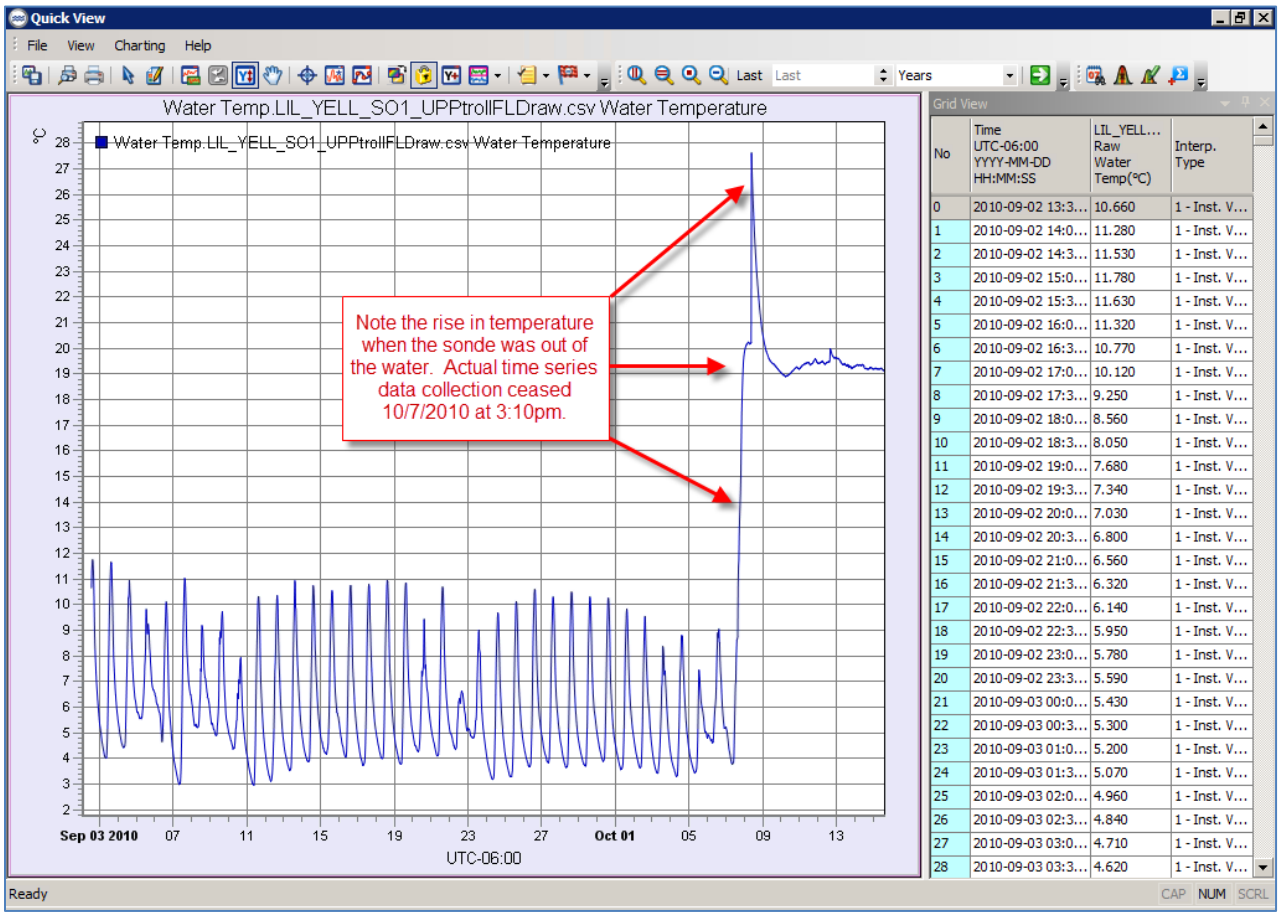
Aquarius imports the 9 parameters and assigns each to an 'Output Port'. To the right of the selected Output Port you can see the selected port's properties including start and end dates/times and summary statistics. Click 'Done' to return to the Whiteboard.



Notice the 'Import from File' tool now has 9 triangles (output ports) affixed to the right side. If you can't distinguish the ports too well you can click on the tool to select it and then resize it by dragging a corner of the box. You can place the mouse cursor on top of any output port and obtain a summary of the subject time series as shown below for the water temperature time series.



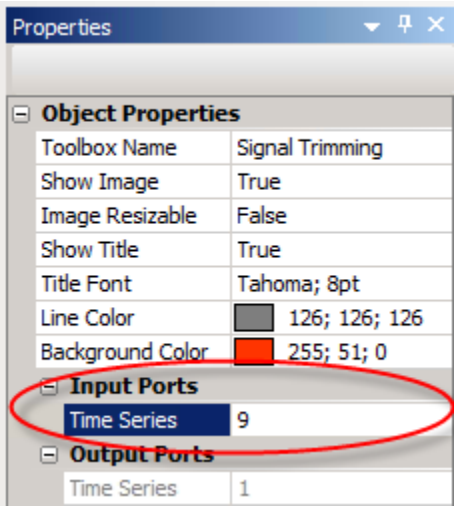
To graph a time series, right-click on its output port and select ‘Quick View’. That will send the subject time series to the Quick View tool as shown below for water temperature. Notice the sharply rising water temperatures at the end of the time series. This is due to the sonde being removed from the water. According to the field notes in the data file, the sonde was removed from the water on 10/7/2010 at 3:10pm. Consequently, all data recorded by the sonde after that time don’t reflect water temperature and need to be removed for all time series/signals collected by the sonde. Let’s see how the Aquarius ‘Signal Trimming’ tool can accomplish this.



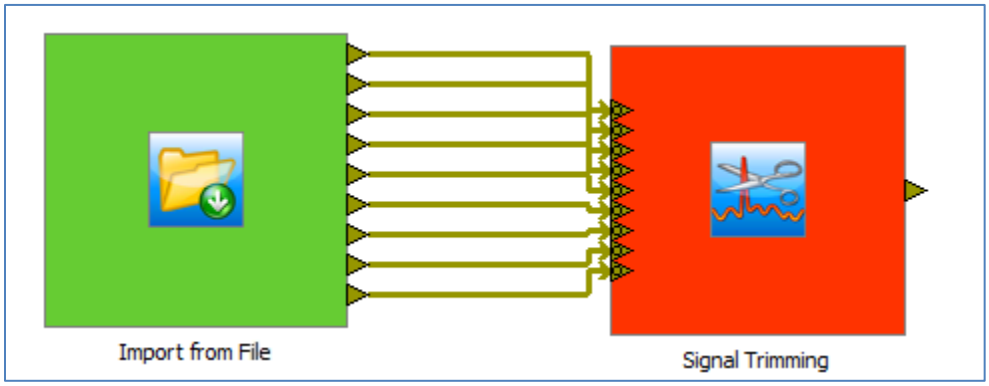
Choose ‘File – Exit’ or click the ‘X’ in the upper right to close the ‘Quick View’ of the water temperature data.

In the Toolboxes pane, click the + next to 'Data Pre-Processing' tool to expand it.

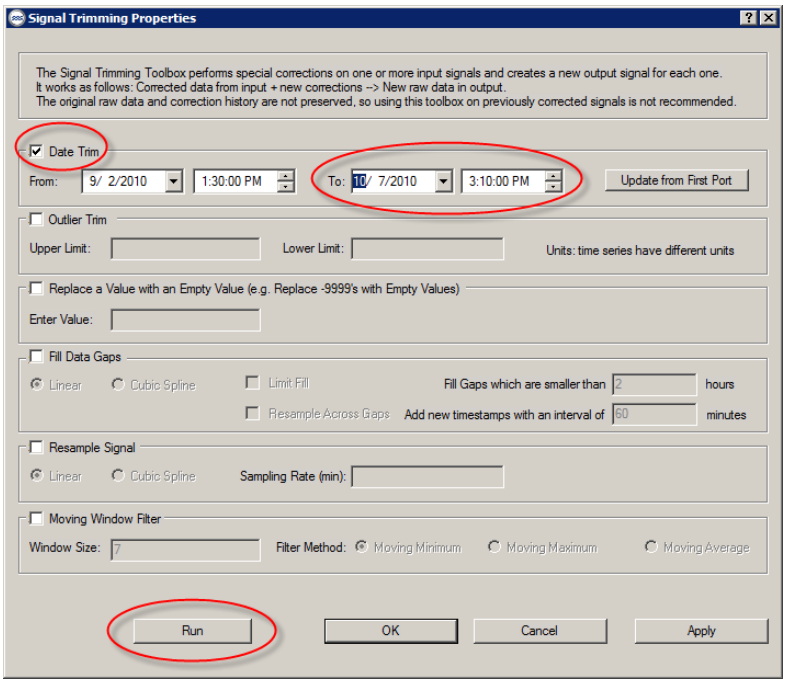
Double-click the 'Signal Trimming' tool to add it to the Whiteboard and drag it to the right of the 'Import from File' tool. Since there are 9 time series/signals that we want to trim, we need to add additional input ports to the 'Signal Trimming' tool. Right click the 'Signal Trimming' tool and select 'Properties Pane'. Change the Time Series entry under 'Input Ports' to be 9 and then close the 'Properties Pane'.



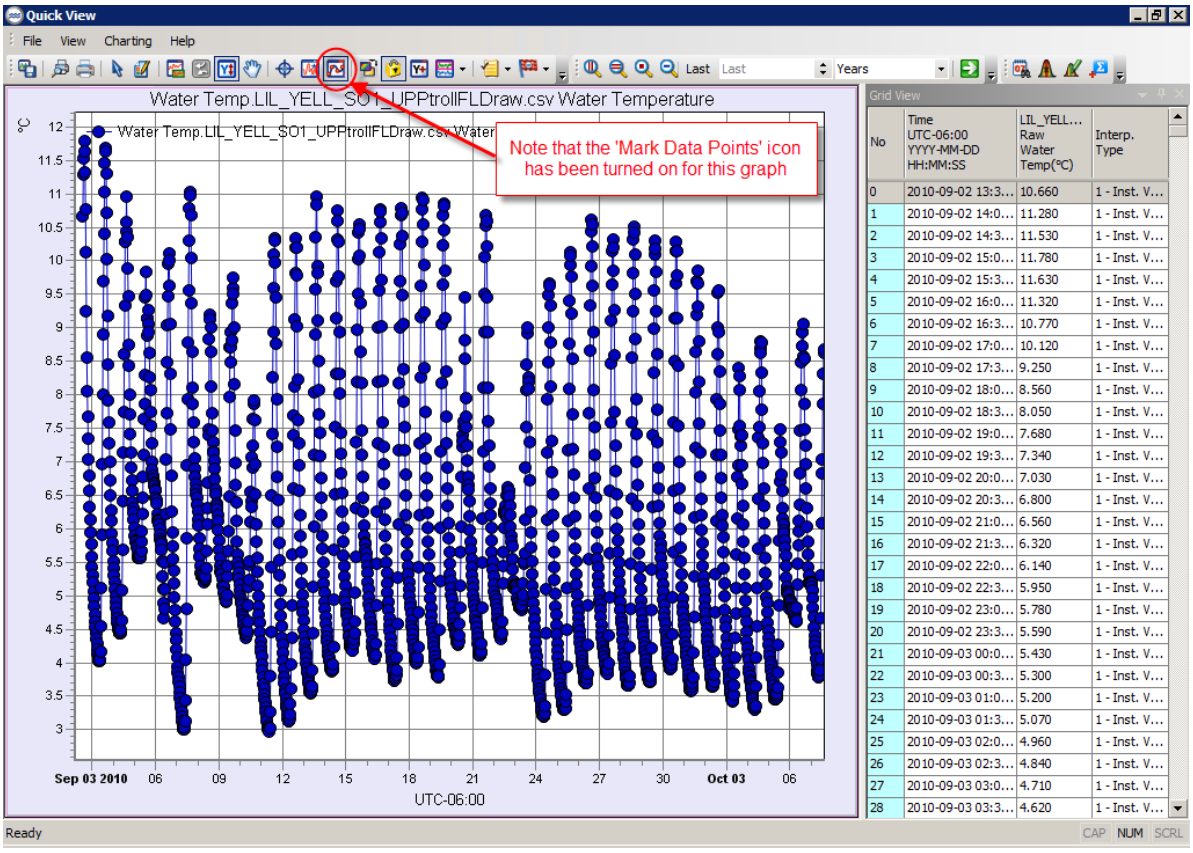
The next step is to 'wire' the output ports from the 'Import from File' tool to the input ports of the 'Signal Trimming' tool by clicking on an output port and dragging a line to an input port so the Whiteboard appears as below. If necessary, you can right click on a connecting wire and delete it.



Once the 'Signal Trimming' tool is 'wired', double-click it to open it. Check the box next to 'Date Trim'. Accept the 'From:' date but change the 'To:' date to be 10/7/2010 and the time to be 3:10:00 PM. Click 'Run'. You will be asked whether to apply the changes to the properties before running the toolbox. Click 'Yes' and then click 'OK' to close the tool.



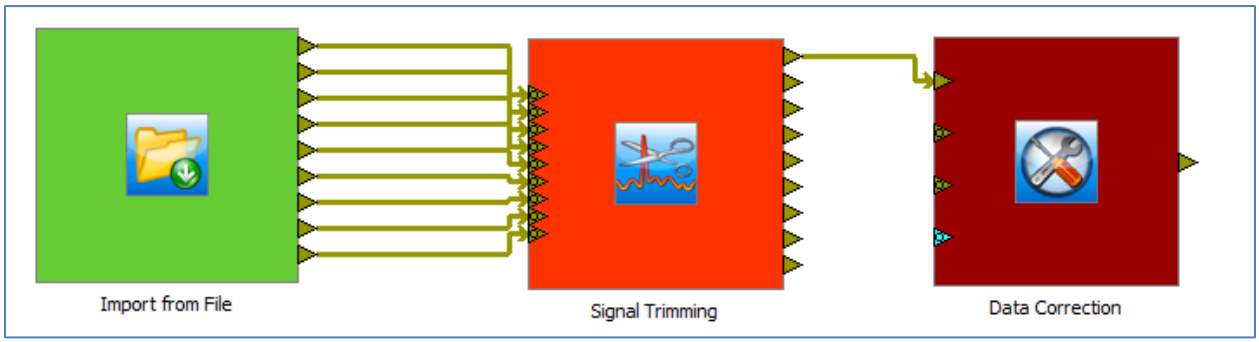
On the Whiteboard, right click the water temperature output port of the 'Signal Trimming' tool and choose 'Quick View'. Notice how the time series no longer contains the measurements after 10/7/2010 3:10:00pm.



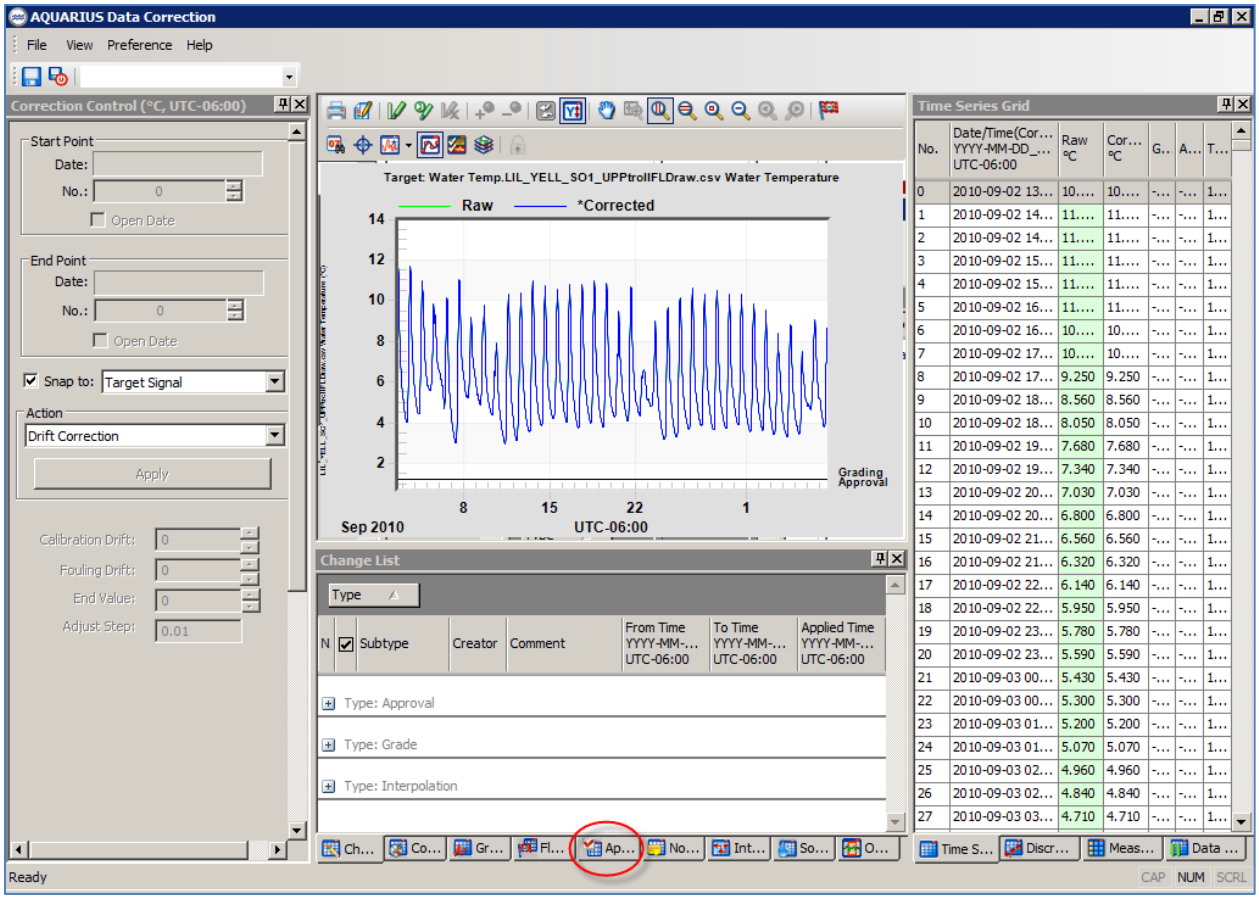
One thing to keep in mind is that the 'Data Pre-Processing' 'Signal Trimming' tool works on raw data and outputs raw data. Consequently, if you trim data using the tool, they are gone. This is in contrast to manipulations involving the Aquarius' 'Data Correction' tool which always preserves the raw data even if you 'correct' your data by deleting spurious values.

Choose 'File – Exit' or click the 'X' in the upper right to close the 'Quick View' of the water temperature data and return to the Whiteboard.

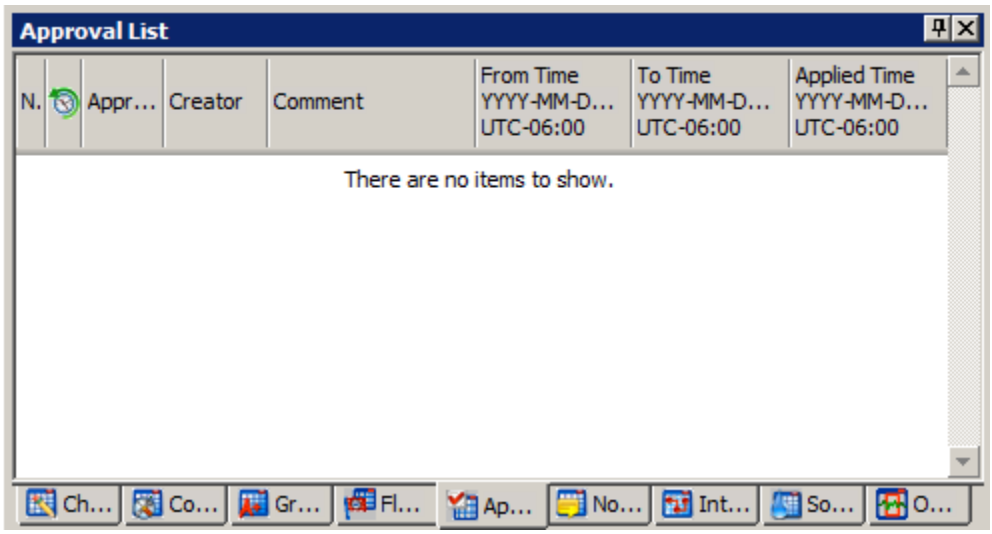
At this point, as dictated by your protocol, you might want to run certain time series/signals through the 'Data Correction' tool to correct for drift or bias or apply (or edit) grades, flags, approvals, notes, interpolation types, and sources. Let's look at the Approvals that were applied to the water temperature values (and all other time series) during import by wiring the water temperature output port of the 'Signal Trimming' tool to the input time series port of the 'Data Correction' tool as shown below. The 'Data Correction' tool, found in the 'Correction' toolbox, is a bit of a misnomer since it isn't just used to 'correct' data but also to add (or edit) attributes of individual results.



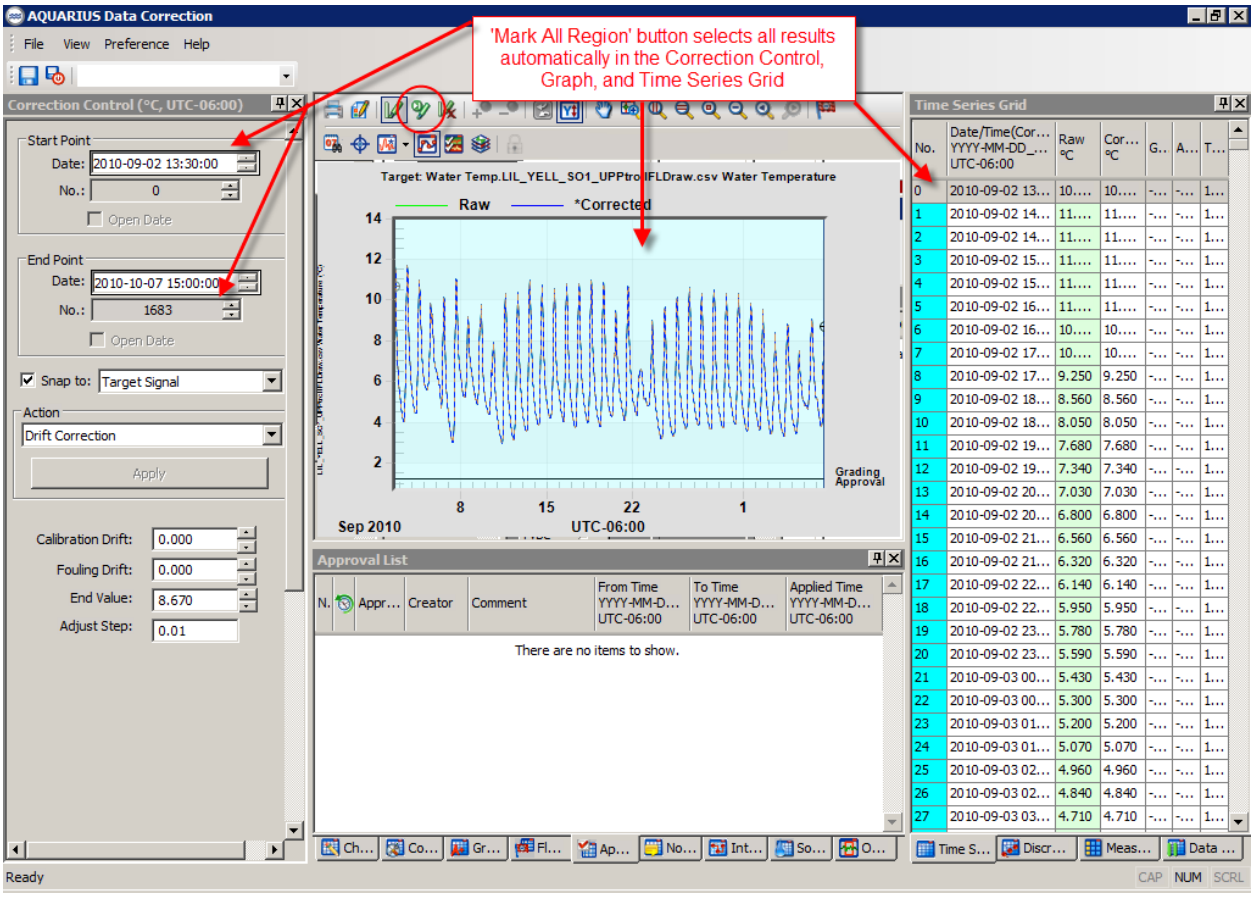
Double click the 'Data Correction' tool to open it with the water temperature time series/signal loaded. The 'Data Correction' tool is a busy series of window panes that you can customize as desired by turning on/off, moving, and/or resizing the panes as desired. To return to the default 'Data Correction' tool view/layout, select 'View-Go to default layout' from the menu at the top of the screen. In a nutshell, you basically use the graph and/or 'Time Series Grid' at right (the default settings) to select the data to work with or to view the results of previous corrections. Corrections are applied using the 'Correction Control' pane on the left. You can see the changes in summary/list form at the bottom via the 'Change List' and its various tabs.



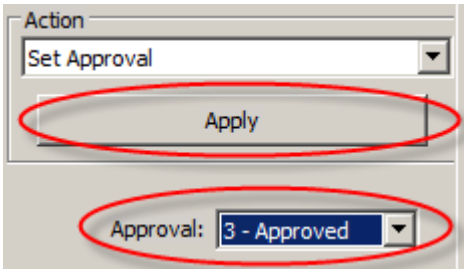
Click the ‘Approval’ (or ‘Ap…’) tab in the ‘Change List’ to see what approvals have been applied to the data. Notice there are no approvals in the list because during the import process above the ‘Approval’ box was left set to ‘Unspecified’ for water temperature as well as the other parameters.



Let's approve all the data. The quickest way to do this is to click the Mark All Region button located above the Graph. This will select all the results in the 'Correction Control' panel (notice results 0 to 1683), Graph (everything highlighted in cyan), and Time Series Grid (result numbers in first column highlighted in cyan).

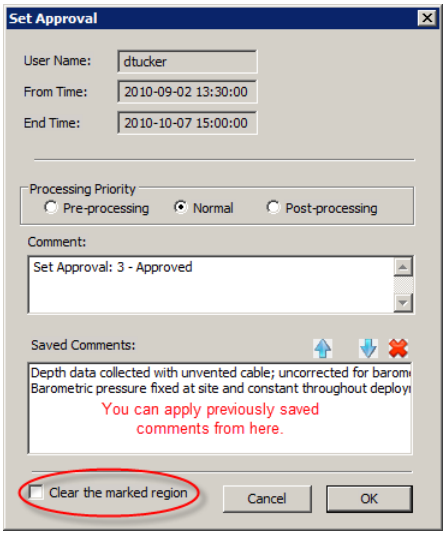


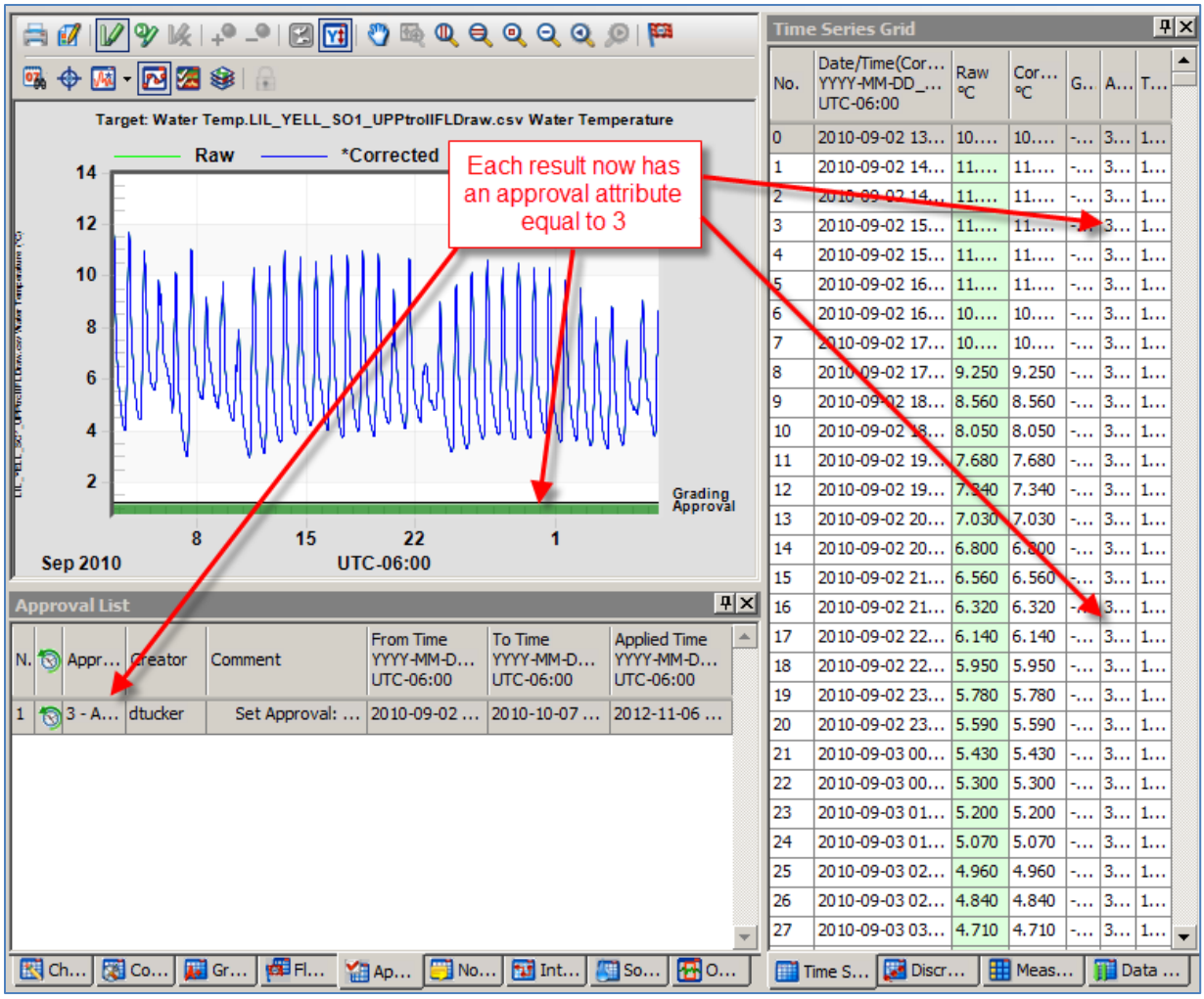
To change the approval for the selected water temperature results, change the 'Action' in the 'Correction Control' panel to 'Set Approval', change the 'Approval:' to '3 – Approved', and then click 'Apply'.



The 'Set Approval' form will appear and allow you to add a comment if desired. You can type in a comment or use a previously saved comment if desired. Notice the 'Clear the marked region' option.

You might want to leave this unchecked if you are doing multiple corrections/edits to the same set of results. For our purpose, just click 'OK'.





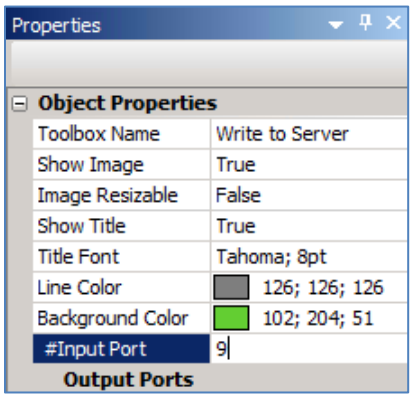
Aquarius will update the approval attribute on each selected result in the 'Time Series Grid', graphically display the range (in green in the graph), and add the approval to the Approval List as shown above.

You'll likely use the 'Data Correction' tool quite a bit to process each time series/signal as per your protocol and then assign relevant attributes (flags, grades, approvals, etc.) to each result. The 'Data Correction' tool never changes the original raw results but instead generates a 'corrected' data stream by applying the corrections specified by the user. This allows the user to toggle on or off data corrections as desired without affecting the original raw data.

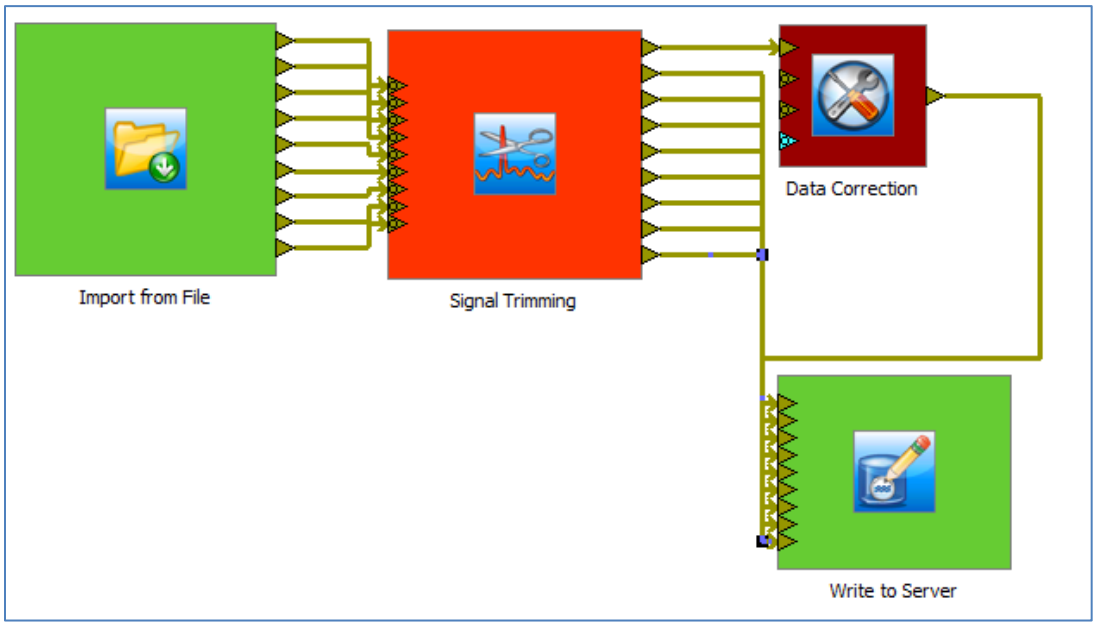
Click the icon in the upper left () to 'Save and exit' or click 'File – Save & Exit' to close he 'Data Correction' tool.

At this juncture let's save our trimmed time series/signals in the Aquarius Database. Back on the Whiteboard, in the Toolboxes pane, click the + next to the 'Data Output' tool to expand it.

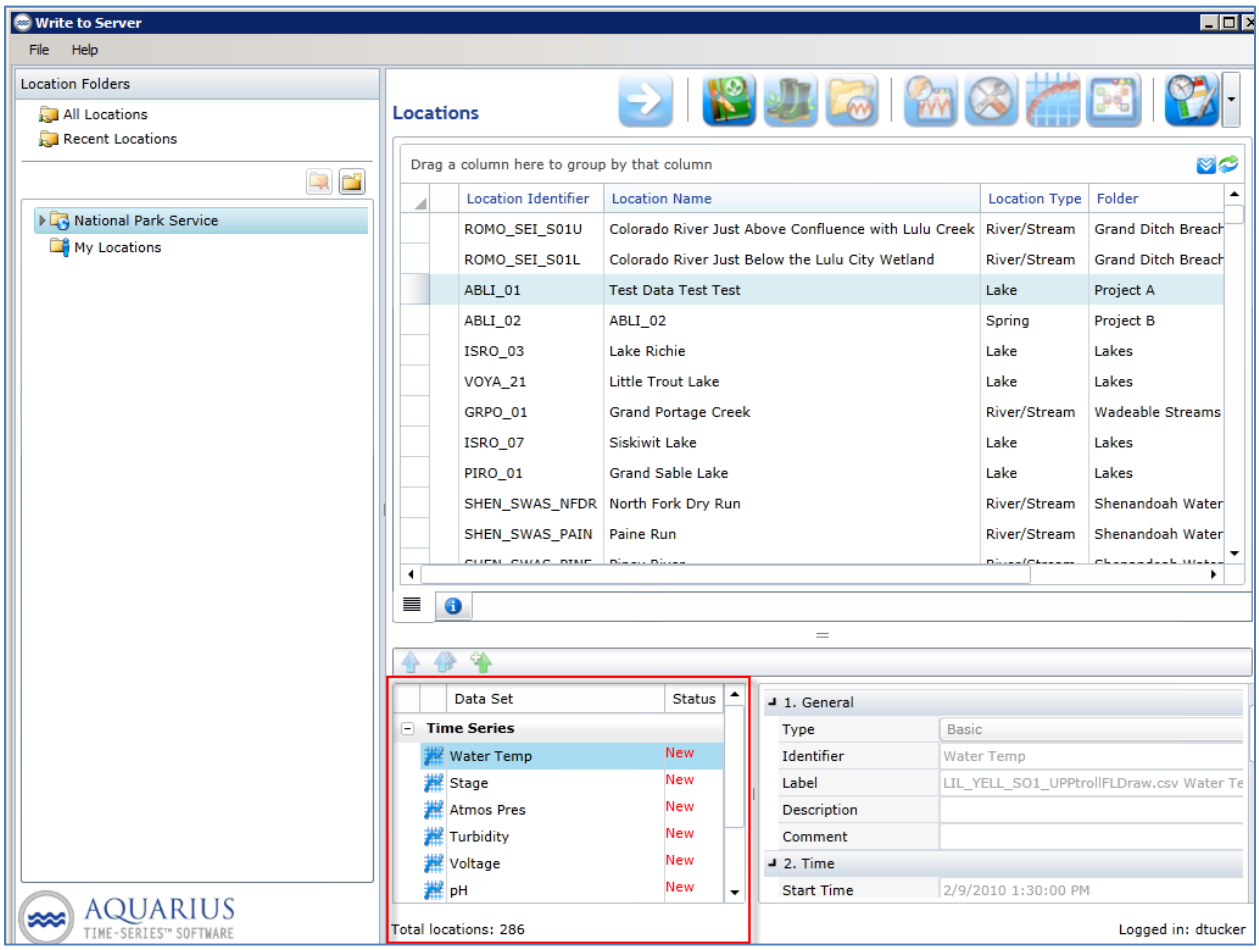
Double-click the 'Write to Server' tool to add it to the Whiteboard. Since there are 9 time series/signals that we want to write to the Aquarius Database, we need to add additional input ports to the 'Write to Server' tool. Right click the 'Write to Server' tool and select 'Properties Pane'. Change the '#Input Port' entry to 9 and then close the 'Properties Pane'.



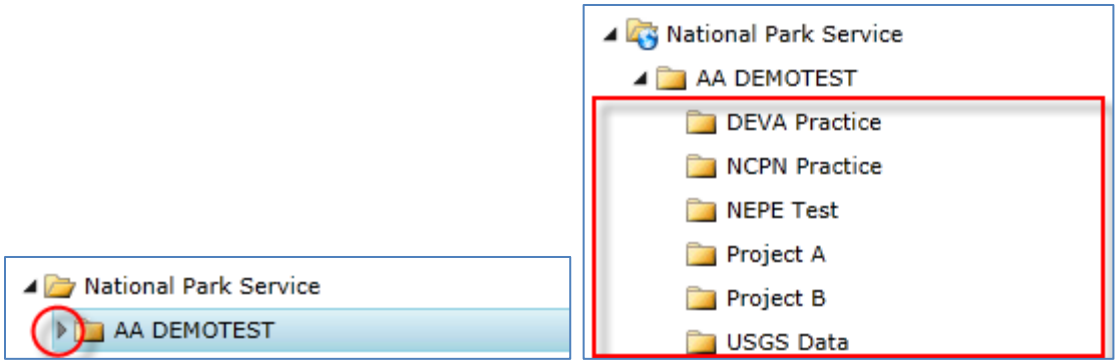
Connect the water temperature output port of the 'Data Correction' tool and the first input port of the 'Write to Server' tool with a wire. Then wire the non-water temperature output ports of the 'Signal Trimming' tool to the remaining 8 input ports of the 'Write to Server' tool. Your Whiteboard should look something like below. We are writing the water temperature to the database after it has been corrected (i.e. we changed the 'Approval' attributes above). The other time series/signals are being saved to the database after signal trimming. In reality, you'd likely want to run all signals through Data Correction before saving them to the database.



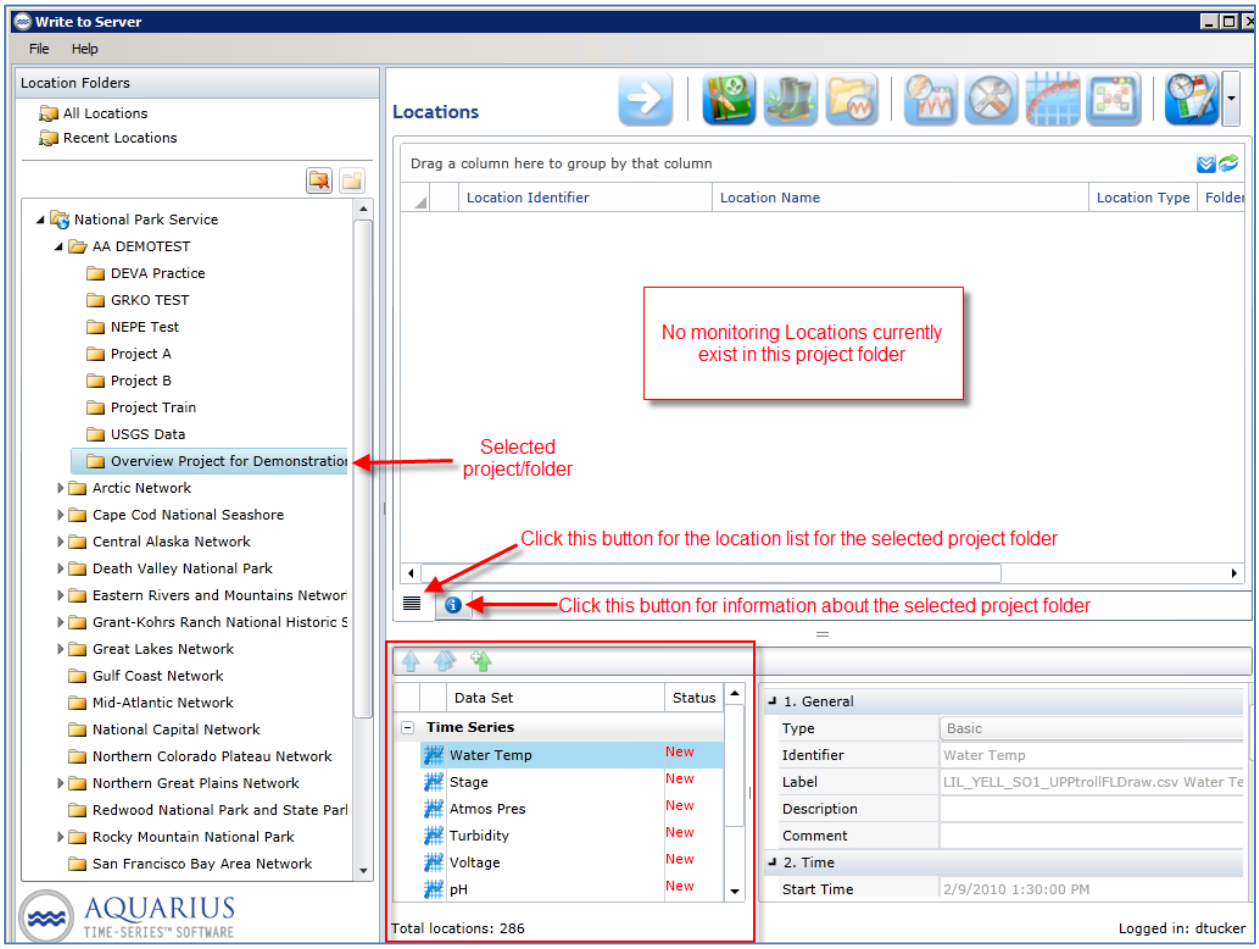
Once everything is wired up, double click the 'Write to Server' tool to open it. The 'Write to Server' tool looks a lot like Springboard, but as invoked from Whiteboard, it doesn't have all the capabilities found in Springboard. The 9 input time series/signals/datasets appear at the bottom. On the left are the 'Location Folders' we'll be using to organize monitoring locations into parks or Vital Signs Networks and their associated projects. Coming in new from the Whiteboard, we need to decide under which: (1) park or network, (2) project, and (3) location to store these time series datasets. If you don't see your park or network in the 'Location Folders' list, let me know and I'll add it.



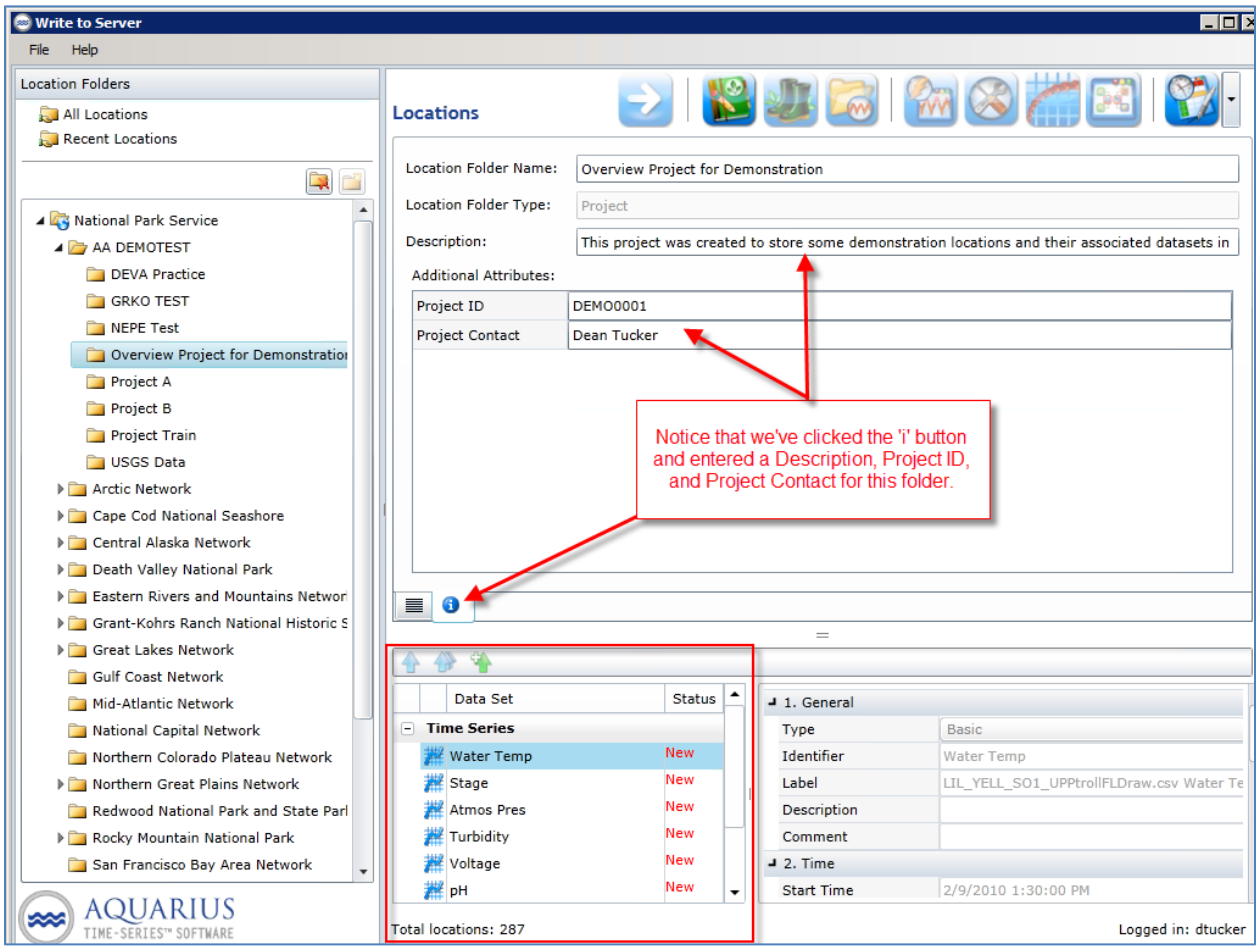
Since these are demonstration data, I'm going to save them under the 'AA DEMOTEST' park/network. If you can't see the 'AA DEMOTEST park/network, click the ▶ icon to the left of 'National Park Service' (the ▶ icon indicates the folder has subfolders). Then, click the ▶ icon to the left of 'AA DEMOTEST'. Aquarius will show the projects associated with it.



If the time series datasets don't belong in any of these projects, you can left click on 'AA DEMOTEST' to select it and then right click on it and select 'New Project'. Find the 'New Project' entry that is created and rename it with a concise but descriptive name. You can see that I named this project 'Overview Project for Demonstration'. It is selected in the 'Location Folders'. The default view to the right is to show you a list of Locations for the selected project/folder … but we have no locations yet.



You can also click the icon to enter/view information about the project/folder as shown below. Clicking on the list icon ( ) will return you to the location list view for the project/folder.

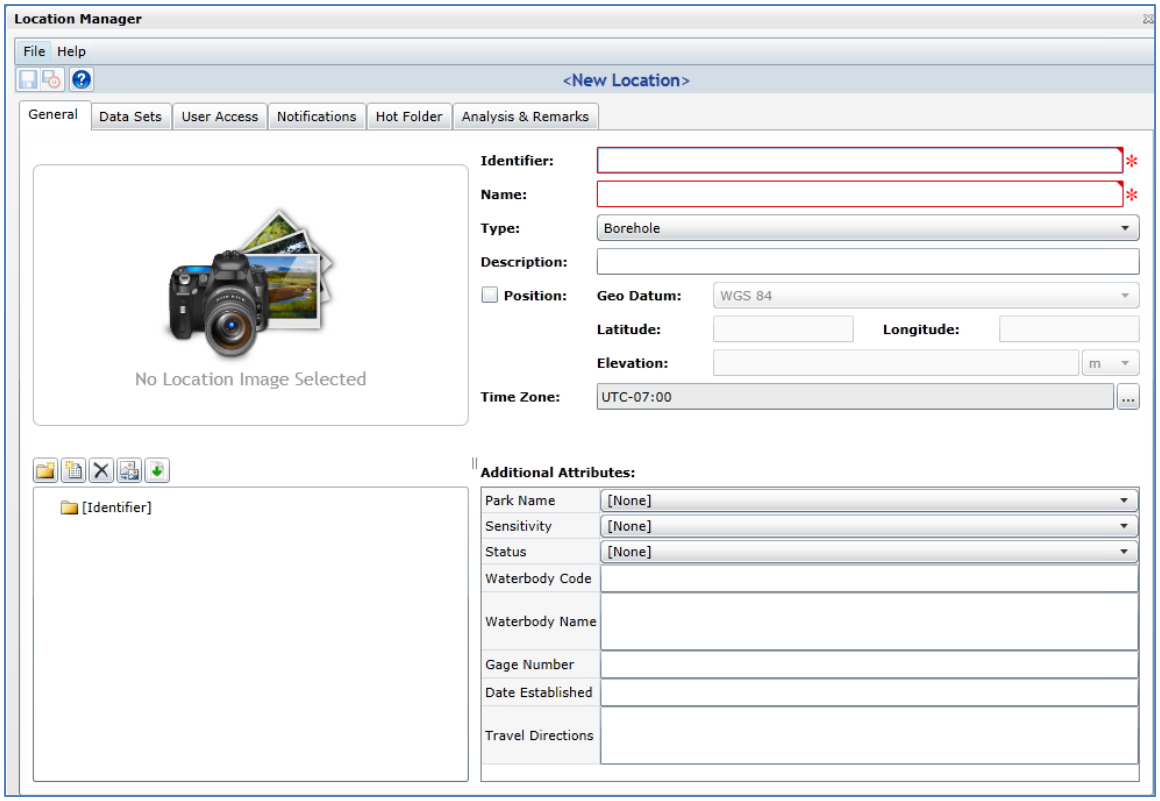


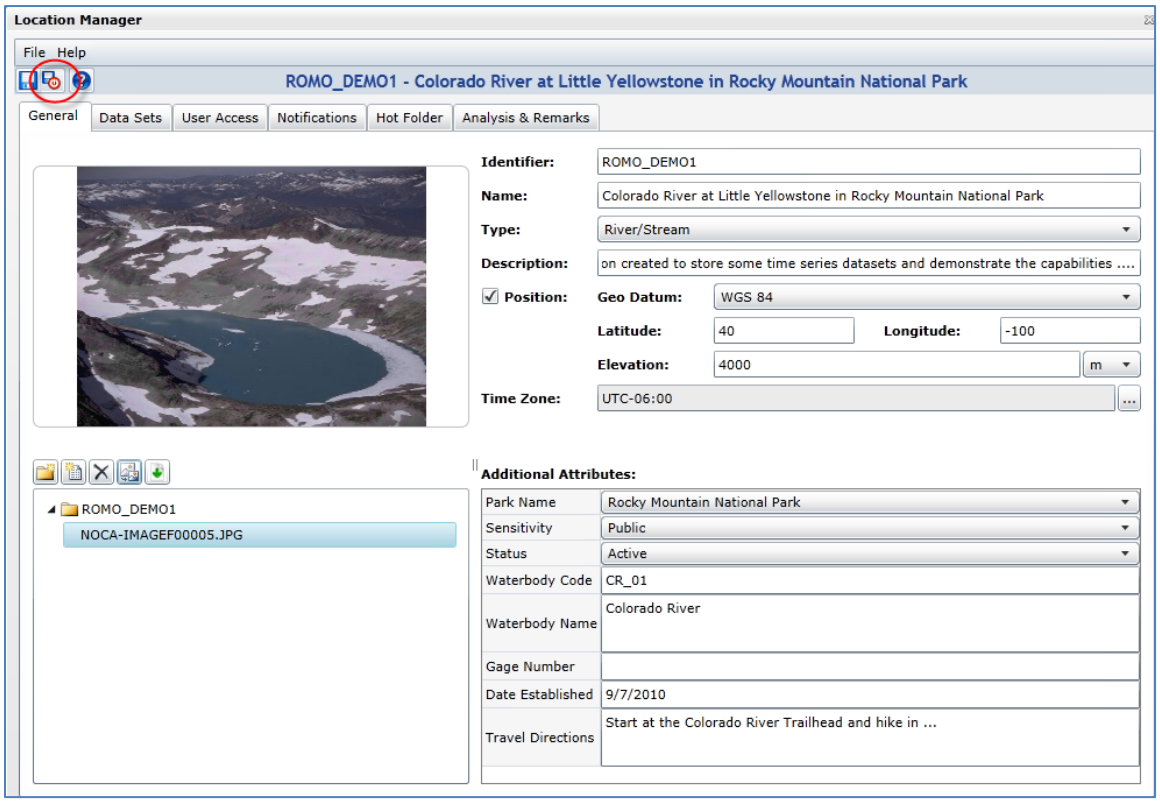
Note: The 'Additional Attributes' fields at the project/folder level are extensible by NPS.

Now we need a station/location to store the datasets under. Right click on the 'Overview Project for Demonstration' folder and select 'New Location'. Aquarius' 'Location Manager' starts.

You can also start the Location Manager by clicking on its icon  while the project folder is selected.

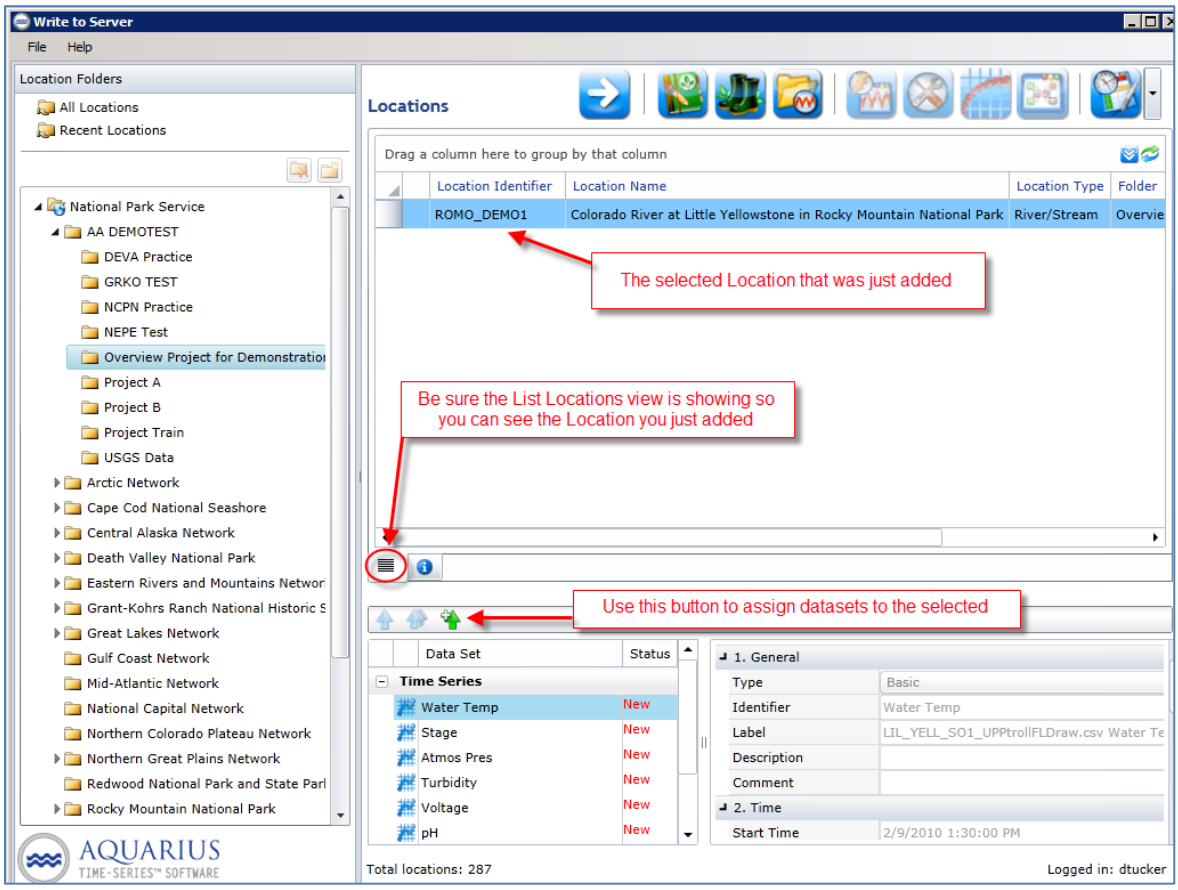
Enter the required fields in red and other fields as desired.





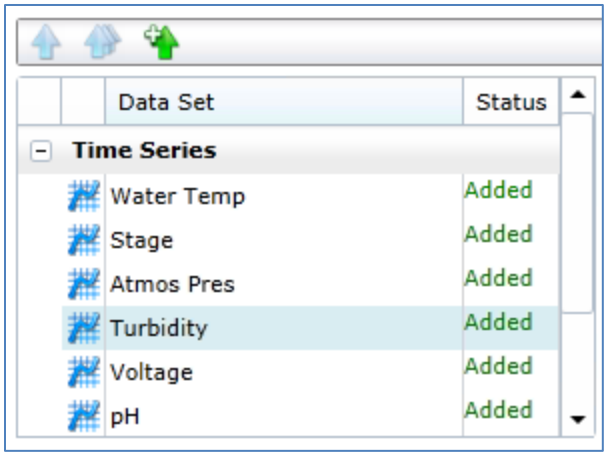
Note: The 'Additional Attributes' fields for locations are extensible by NPS.

When you are done defining your station/location, click the 'Save & Exit' button ( ) or 'File – Save & Exit' to return to the 'Write to Server' tool. Click on the 'List View' icon ( ) for the project/folder and you should see the location you added appear in the list. Select the location and you'll notice this icon ( ) becomes active above the Time Series Datasets. Select the 'Water Temp' time series dataset and then click . Then select 'Stage' and click … and so on to add each time series dataset to the selected location. (We've already asked Aquatic Informatics for a select all or block select option here).



When done, all time series should have a 'Status' of 'Added'.

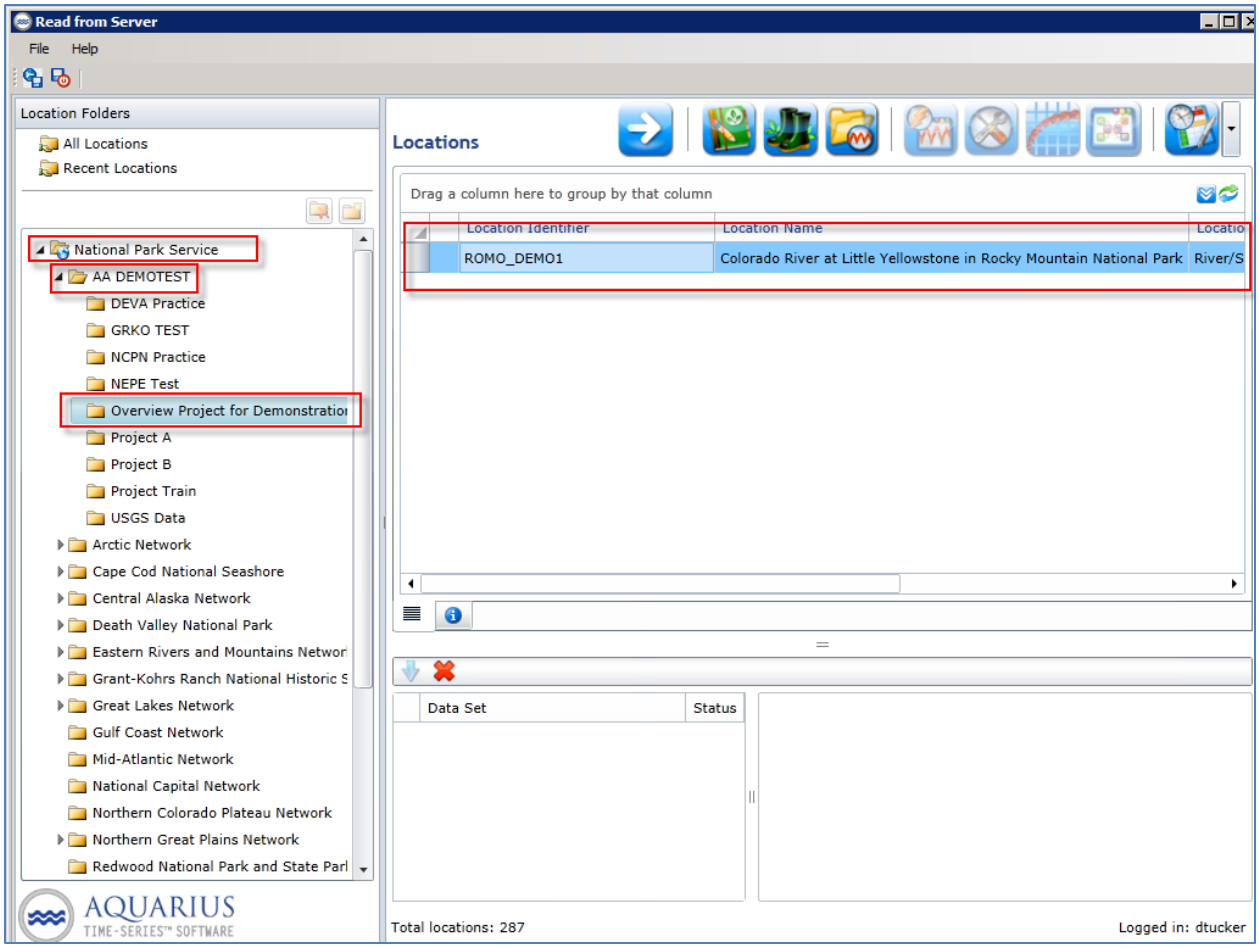
Select 'File – Exit' to leave the 'Write to Server' tool and return back to Whiteboard. The data now exist in the Aquarius database.



Back at the Aquarius Whiteboard, you'll probably still want to save your Whiteboard for future reference or processing. You can do that by choosing 'File – Save As'. It is also good to save your Whiteboard occasionally as you work in case network interruption or other problems arise. Whiteboards are also handy for documenting processes or sharing with co-workers looking to do similar analyses or operations.

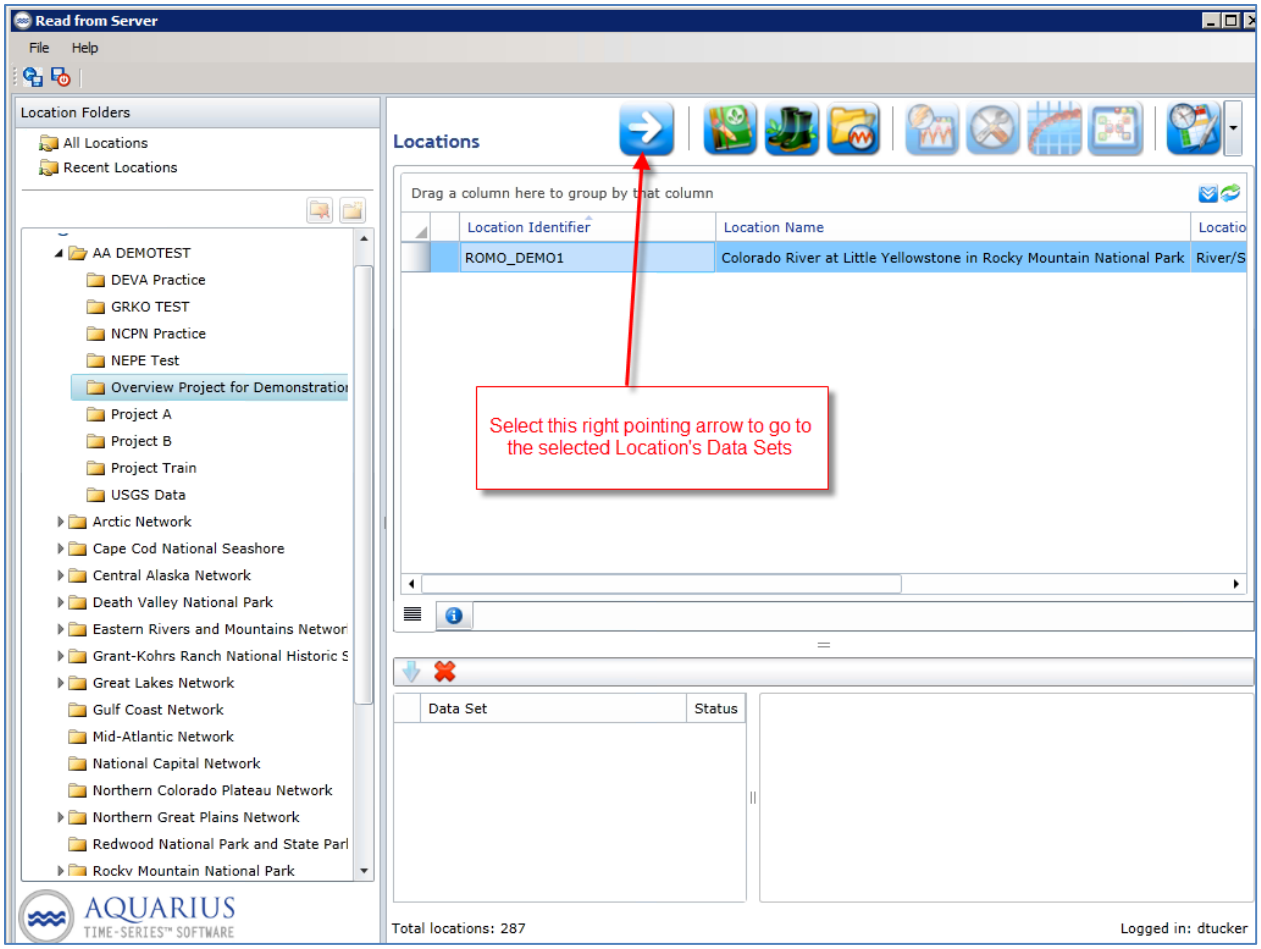
Now let's look at how to use data stored in the Aquarius Database on the Whiteboard. Although you could do this on the same Whiteboard as above, let's start with a clean one. Choose 'File – New'. Open the 'Data Input' toolbox by clicking the + sign to its left.

Double click the 'Read from Server' tool to add it to the Whiteboard. (Note: We won't be using the 'Read from v2.7 DB' tool. That tool is used only for reading from an Aquarius v.2.7 database). Double click the 'Read from Server' tool to open it. You'll see an interface that looks a lot like the 'Write to Server' tool and the Springboard interface. There are multiple ways to find the location containing the datasets we just saved. One way is to click the icon to the left of 'National Park Service' in the 'Location Folders' (if 'National Park Service' isn't already open). Then click the icon to the left of the 'AA DEMOTEST' organization folder if it isn't already selected/open. Next, select the project folder 'Overview Project for Demonstration'. Finally, click to select the 'ROMO_DEMO1' location that we created previously. This approach is shown below.

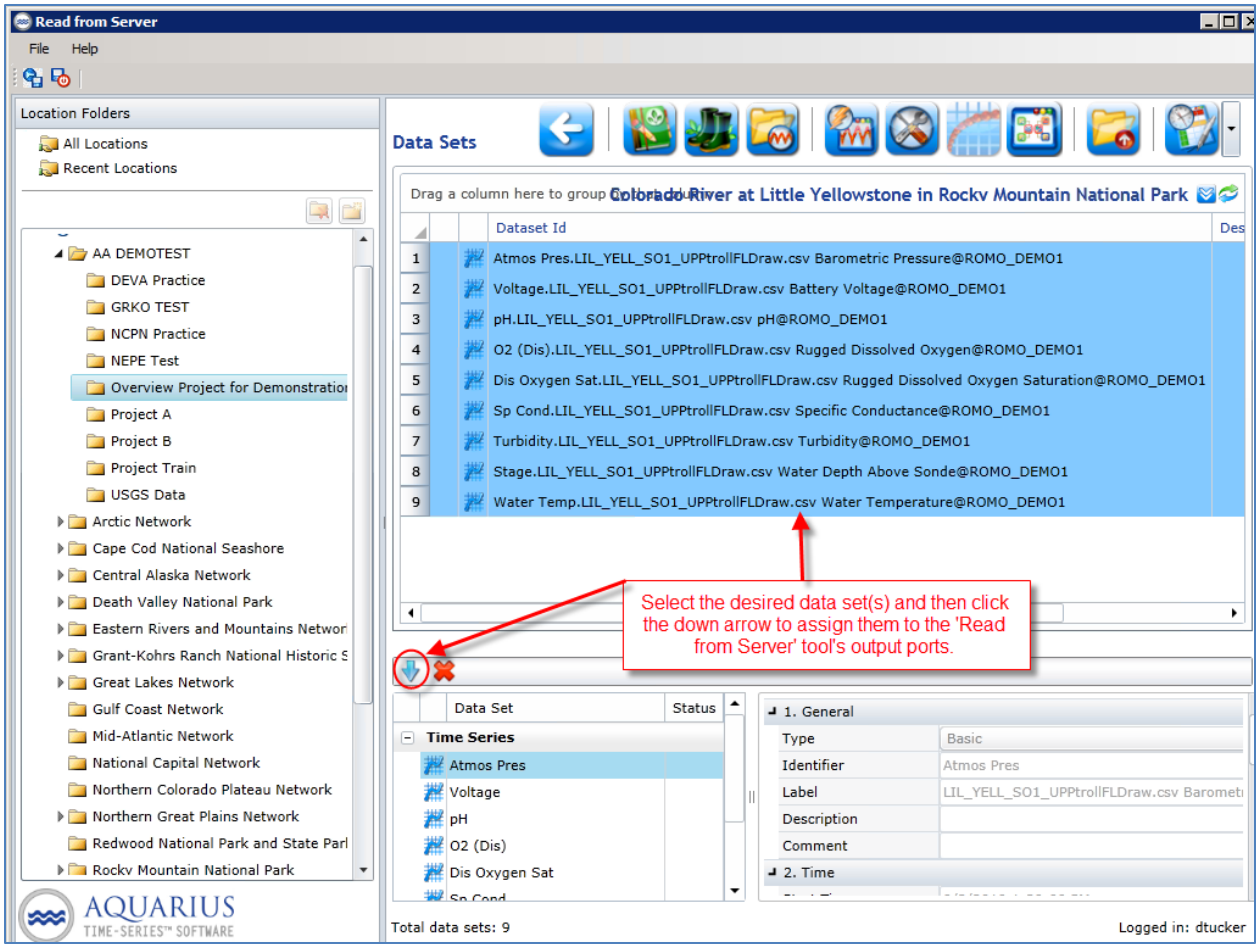


Alternatively, we could have reached this location by selecting simply ‘National Park Service’ or ‘AA DEMOTEST’ and scrolling through their Locations to find ROMO_DEMO1 which would be at the bottom of the list for both organizations. You can also click the down arrow to the right of ‘Location Identifier’ in the Location list and filter the folder’s locations based on a string in the ‘Location Identifier’. The object is simply to find and select the location that contains the desired time series datasets.

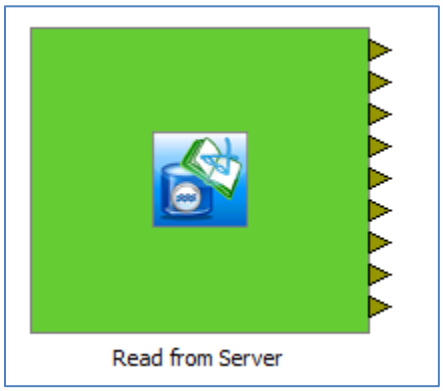
Once the location containing the time series dataset is selected, click the large, right-pointing blue arrow at the top of the screen (first icon) to go to the selected location’s data sets.



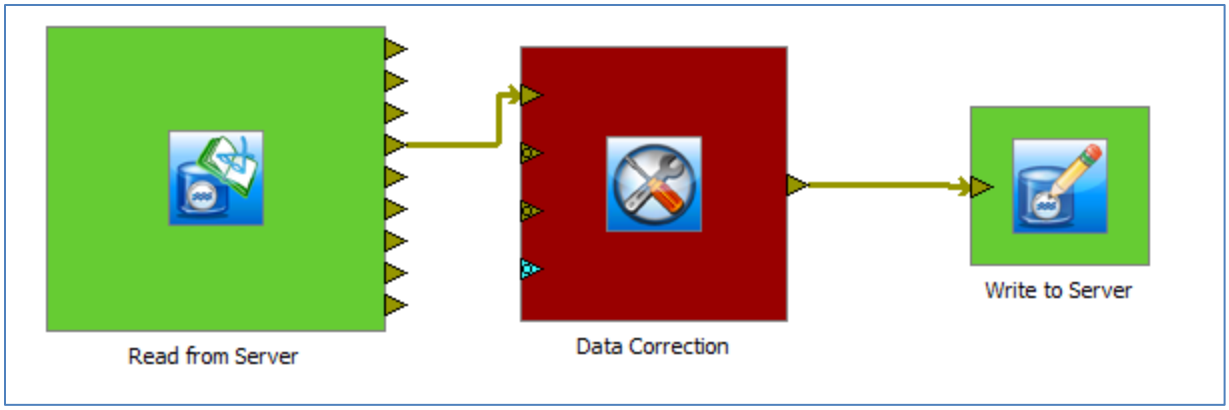
As shown below, a list of available 'Data Sets' will appear. Hold down the shift key and click the first dataset and the last dataset to select them all and click the down arrow ( ) to assign the datasets to the 'Read from Server' output ports. Click the icon in the upper left ( ) to 'Save to output port and exit' or click 'File – Save to Output Port and Exit'.



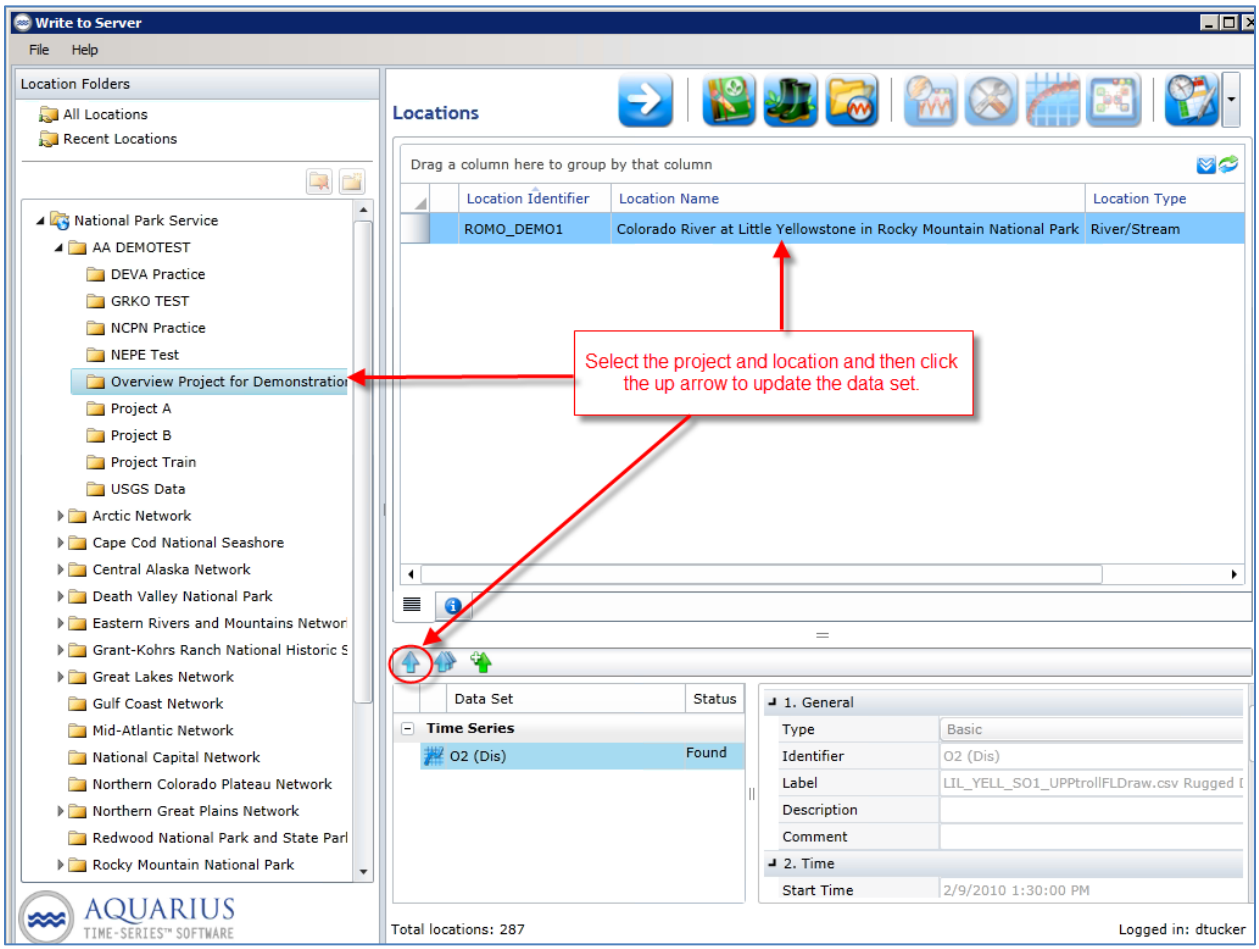
The ‘Read from Server’ tool will appear on the Whiteboard with 9 output ports ready for additional processing.



Suppose you wanted to run the dissolved oxygen time series/signal through the ‘Data Correction’ tool to set its ‘Approval’ to ‘3 – Approved’ and then save it back to the database. The Whiteboard might look something like this:



Once you've used the 'Data Correction' tool to edit the 'Approval' attribute for the 'O2 (Dis)' data, double click the 'Write to Server' tool. Select 'AA DEMOTEST' and the 'Overview Project for Demonstration' as necessary to find the 'ROMO_DEMO1' location. Then select the 'ROMO_DEMO1' location. Select the 'O2 (Dis)' time series Data Set and click the up arrow ( ) to update the selected time series in the database.



You ‘ll see:

which means the time series has been updated for ‘ROMO_DEMO1’ in the database. You can click ‘File Exit’ to close the ‘Write to Server’ tool.

That concludes this quick introduction to the Aquarius Whiteboard and Database. Aquarius is a sophisticated system with many capabilities beyond what was briefly demonstrated here. Consult the on-line help and the additional resources below for more information on how to harness these capabilities for your park or network.

Important Notes:

When you work in Whiteboard, changes you make are not automatically saved in the Aquarius database. You must use the ‘Write to Server’ tool to save any changes you make to the Aquarius database. Saving your work as Aquarius Whiteboards (File Save As) does save everything (including the processing logic) … but saves it to a stand-alone file rather than the Aquarius database. In contrast, when working with data in Aquarius Springboard, changes are automatically saved because Springboard interacts directly with the database.

When you complete your Aquarius session by exiting Whiteboard (or closing the Springboard web page), be sure to also right-click on the Aquarius Assistant icon in the Task Bar and choose 'Exit' to free up the license you were using sooner for other would-be users.

Additional Resources:

The Aquatic Informatics support portal at http://aquaticinformatics.com/main/%3FSupport_Login provides a lot of ‘How To’ videos for both Whiteboard and Springboard. To log into the Aquarius 360 support portal, you’ll need a username and password which can be obtained via an email request to support@aquaticinformatics.com.